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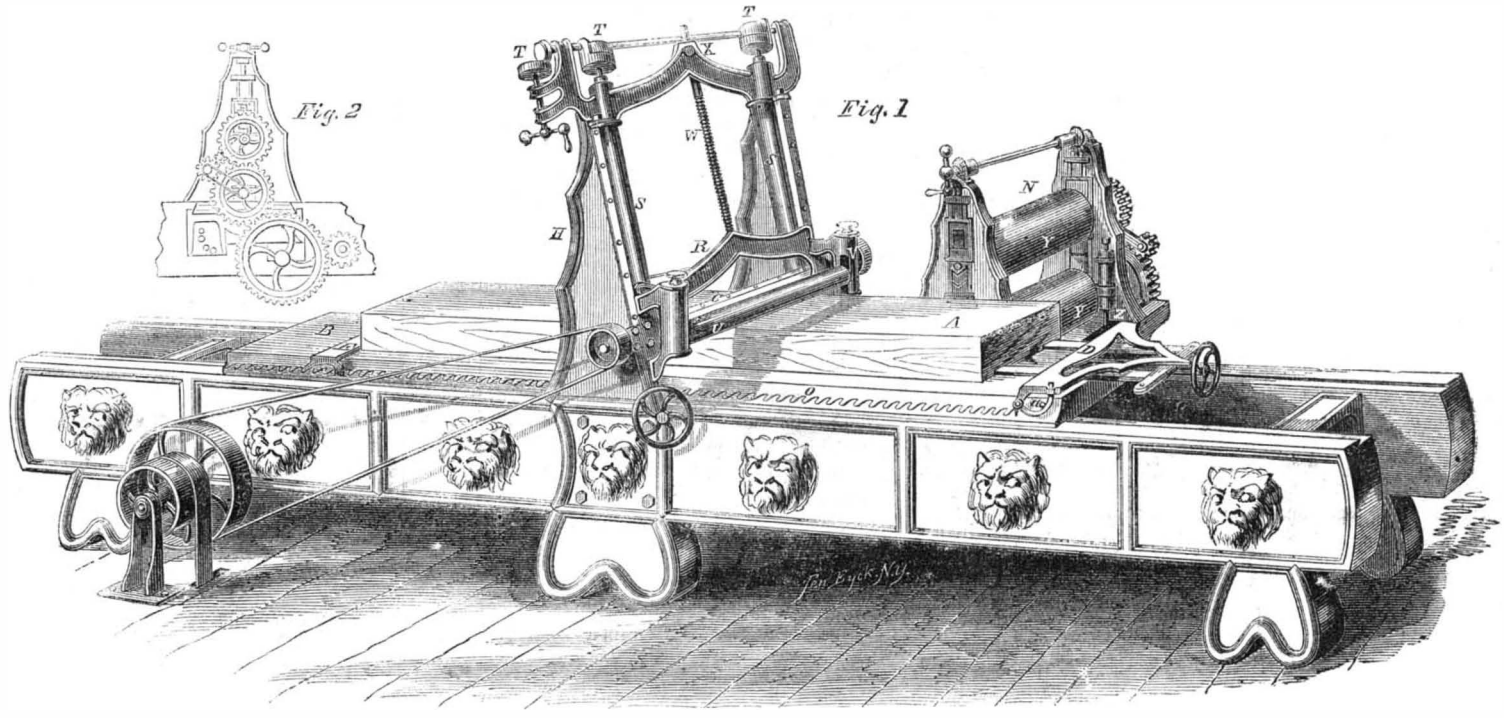
IMPROVED COMBINATION PLANER.

The accompanying engraving represents the Stover Machine Company's combination planer, the several peculiarities of which were invented by H. D. Stover, of this city, and secured by Letters Patent issued May 19, 1857, Aug. 21, 1860, and Sept. 14, 1860.

The cut shows the machine as arranged for doing the work of a Daniels' planer, planing straight and out of wind, and squaring up and surfacing heavy and dimension timber or boards.

The stuff, A, is held firmly to the platen, B, while being passed under the cutting cylinder by the dogs, D and E. The dog, E, is moved from end to end of the platen, B, simply by raising the back end out of the notch in the rack, O. The dog, D, is fixed to the platen by means of pins, *a*, placed in the sides of the platen, and the apparatus that carries the dogging bars is so arranged with adjustable and variable inclined planes pressing against the pins, *a*, so that any desired pressure may be attained, both to press the dogs forward into the stuff, and to hold them down securely to the platen by turning the hand wheel attached to the screw. The rack, O, is made with mouth pieces, so as to prevent chips lodging therein. The platen is constructed of iron below, with a top of wood, and, when so ordered, made in two parts, with a ball between, so as to tip universally and be secured to plane stuff either beveled or level and parallel in thickness. The platen is moved on ways constructed with an adjustable gib rest, which can be taken up, and which also allows of the frame being constructed much shorter than formerly, as it is impossible for the platen to tip up in end. The platen is moved back and forward under the cutting cylinders by means of a friction feed, and so arranged as to run back twice as fast as forward, being moved either way by simply turning the hand wheel, Q, to the right or left, as the case may be. This is a great advantage, as the jar of starting a heavy piece of work suddenly is wholly obviated, and the platen can be reversed much sooner than formerly, and it is impossible to strip any teeth—a difficulty often encountered before. The platen is also constructed to run on rollers when carrying heavy loads, thus diminishing the power used to overcome the friction of the parts; these rollers being thrown into use or out in a moment. The cutting cylinder, C, is furnished with flat cutters, beveled on their outer surface and parallel to the axis of the cutter head, C; the cutting edges being in the surface of a cylinder whose axis is coincident with the axis of motion, so as to impart a drawing stroke, the drawing stroke being well known among all workers of wood to be the only stroke that easily removes the chip and leaves a smooth surface. The cutting cylinder, made of the best wrought iron with steel bearings, is also so formed as to make a heel or cap iron for the cutting knife, being adjustable, like a hand plane, for the purpose of cutting fine or heavy, in either hard, soft, straight or crooked grain wood, as the case may be. The heel iron formed on the cutting cylinder is so constructed as to break the chip and cause it to be thrown from the cutting cylinder as soon as cut, thus making the action of the cutting cylinder perfectly free by the action of the recesses and pressure edge. The cutting cylinder is raised by means of a screw attached to each end of its crosshead, thus securing it exactly parallel with the face of the platen, either in its elevation or depression. The cutting cylinder is run in long boxes at each end, said boxes being lined with Babbitt metal, and supplied with a new and superior arrangement for oiling the bearings so they can never heat. The crosshead, R, is secured to the upright posts, H, by means of a gib rest, and can be adjusted very readily, thus preventing any side motions or insecurity, and doing away with the hook bolts formerly used. The screws for raising the crosshead are encased in pocket, S, cast on the upright frame, H, and thus securely kept free from shavings and dirt, whereby they last much longer. At T T T are the bevel wheels for communicating the motion from the handle to the horizontal shaft, and thence to the screws; these bevel wheels being encased in an ornamental shell of iron, and secured free from the annoyance of dirt and shavings, being free to work at all times without cleaning the shavings from them. The raising screws run in the crosshead and tie at the top of frames in nuts constructed with a rolling fit in a loose pocket, for the purpose of always being in line without binding, and still perfectly secure and without play when at work. The crosshead is arched in the center, thus admitting of the free exit of shavings, and when so desired, a tube is constructed to carry the shavings to the fire room of the mill without the exertion of any extra amount of power or any complication of parts.



STOVER'S IMPROVED COMBINATION PLANER.

At the back of the crosshead, R, is a frame secured, and to it are attached an adjustable pressure roll, wiper and gage. The pressure roll can never mar the board by pressing shavings into its surface, as the wiper effectually cleans the surface of the lumber before it comes in contact with the roll, and there is also a steel scraper in contact with the roll to clean it of any pitchy or glutinous substance which may attach to it, and which, if not removed, would soon press into the lumber and deface it after being planed. In combination with the roll is also a gage, used mostly for soft and very thin work, as it comes closer under the cutting cylinder, and by the turning of two thumbscrews, either the gage or the roll may be thrown down, and in use depending upon the kind of lumber to be planed.

In front of the cutting cylinder is seen the front pressure roll, U, and its boxes, V V. The boxes are so constructed as to carry the pressure within them precisely as set, and under any elevation of feed; they are readily adjusted to carry any pressure desired. The advantages of this arrangement are very obvious, as every practical man has seen the great disadvantage of planing a piece thin at one end and thick at the other. At the thin end, when the work of cutting the chip was comparatively small, the spring exerted little or no force,

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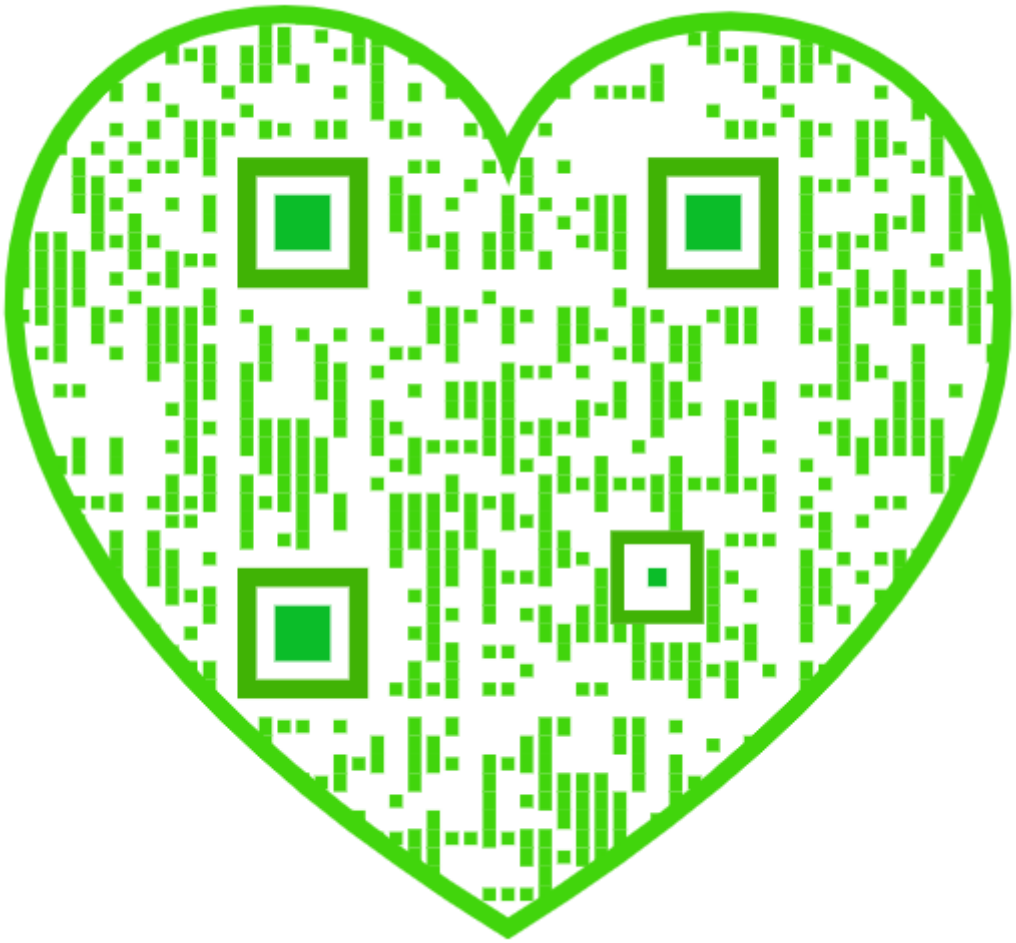


for it was extended nearly in its natural position; but when the heavy chip came to be taken off, and the power of the machine was being exerted for that purpose, there was also required an extra power to run the stuff under the pressure roll in consequence of the force exerted by the spring in its much contracted and depressed state. Another great advantage is seen in this arrangement when changing from dry seasoned to wet and sappy lumber, as the increased pressure upon the rolls on the last named lumber can very readily be obtained.

At W is seen the gage attached to the crosshead, R, and running through an eye in the tie between the side frame at the top. This gage serves a double purpose. On its front surface are marked inches and fractional parts, indicating, by reference to X, the thickness of lumber being planed upon the platen. At X is a thumb-screw which, being set hard down, holds the gage, and thereby the crosshead and cutting cylinder form any movement, either by jar or otherwise, and securing a perfectly parallel thickness throughout the piece being planed. At N, Fig. 2, are seen the feed rolls, or Woodworth attachment, for surface-planing only, and such work as was formerly done on the Woodworth planers. This apparatus consists of two frames for supporting the work, into which are placed the boxes, and the rolls, Y Y. The bottom roll is smooth and adjusted in hight by set screws secured in the bottom of the frame and supporting its journal boxes, elevating the roll exactly to the proper position for passing the boards (or plank) under the cutting cylinder. The upper roll is creased so as to adhere to the lumber being worked, to secure its proper passage along under the cutting cylinder. At each end it is secured by and revolves in boxes of the same construction as the front pressure roll boxes, carrying its pressure always the same, however varying in thickness the piece being planed may be, supplying the place of weights and levers formerly used, and overcoming the objections formerly urged to the use of rubber springs, which always held the same pressure when planing a thick or thin piece. The upper roll is elevated and let down by a handle, bevel wheels and screw similar to those used for raising and lowering the cutting cylinder crosshead.

The rolls are moved by an independent feed arrangement from the shaft which runs the cutting cylinder, and they are connected at the end and are always in gear with each other, by means of an ingenious combination of radiating arms and gear wheels, running easily and very strongly, and so constructed as to be free from shavings. The feed rolls are shown as out of gear; when not required, they are slid out of gear by simply pushing the frames in end on a frame provided for that purpose, and when wanted, the platen is run out of gear, and the feed rolls are pushed in place, running into gear, and securing themselves perfectly solid, as if constructed in the place; the time required to shift from planing straight and out of wind to that of surfacing being merely nothing. The sides of the machine are constructed of iron, with the legs cast on them, thus making a very secure framework. At Z are seen matching heads for matching the boards before they are run under the cutting cylinder, which are so arranged as to automatically find and correctly match the entire length of the edge of a board. To the feed rolls is also attached a mouth piece for entering boards with much expedition and certainty of action. The machine is got up in a very thorough manner, wholly of iron and tastefully ornamented, the castings being of a new and beautiful design.

The office of the Stover Machine Company is located at Nos. 11 and 13 Platt-street, this city, to which place persons desiring further information should apply.

See advertisement in another column.

THE ORIGIN OF COAL OIL.

[Written for the Scientific American.]

The discovery of oil springs and wells in various parts of our country has excited of late the interest and attention of the scientific as well as of the speculating world. That there should be such vast accumulations of mineral oil within the bowels of the earth, stored up for use and to be obtained by merely tapping, is in itself one of the most remarkable geological discoveries of the day. To account for the origin or formation of this oil has led to many wild and visionary theories, among which we cite the following: That the oil was an original creation of the Almighty architect of the globe, and, of course, no more wonderful than any other of His creations; that the oil is a drainage from the coal beds; and your correspondent (page 211 of the current volume of your journal) gives another, which is, that the oil of Western Pennsylvania is the condensed gases thrown off in changing the coal of Eastern Pennsylvania into anthracite.

With the view of throwing light upon this subject, and to give what I conceive to be the true explanation of the phenomenon, I will lay down a few acknowledged principles and then give a brief statement of the geological formation in which coal, oil, bitumen and kindred hydro-carbons are found.

1st. Coal and bitumen are of vegetable origin; but bitumen is not confined to the vegetable kingdom; it may be found also in the animal.

2d. The vegetable matter may be either land plants or water plants.

3d. That, by cosmical chemistry (by this term we understand those chemical operations which take place spontaneously within the bowels of the earth), vegetable matter may be converted into bitumen, bituminous coal, cannel coal, semi-anthracite and anthracite; in a word, all the varieties of coal known to scientific and practical men. Vegetable fiber is composed of carbon, 36 parts; hydrogen, 22; and oxygen, 22. Now, if from this formula we extract 3 equivalents of carbon, 3 of hydrogen and 9 of carbonic acid, there will remain the precise formula of many of the coals. In this way vegetable fiber may be converted into carbon. Carbureted hydrogen (commonly called *marsh gas*) is composed of carbon, 2 parts; hydrogen, 4. This gas is constantly escaping from bog lands and pools of stagnant water having vegetable matter in the bottom; showing that there is decomposition of vegetable fiber going on, the proceeds of which are bi-carbureted hydrogen, instead of carbonic oxyd, as in the ordinary process of decomposition by combustion.

4th. Having shown how coal and bitumen may be derived from ligneous matter by the powers of Nature's chemistry, it is fair to infer that the same power is capable of forming mineral oil or petroleum. According to Dumas, petroleum is composed of carbon, 3 parts; hydrogen, 5. These elements may all be derived from the decomposition of ligneous fiber. This inference is quite a certain conclusion, when we consider that all the rocks from which flows mineral oil—are rich in bitumen—constituting what geologists call *bituminous shale*.

5th. We have a similar exhibition of the power of cosmical chemistry forming compounds from original elements in the lime springs of Onondaga county, N. Y. No beds of rock salt have ever been found in the Onondaga salt group of rocks, but the elements of muriate of soda are distributed through the entire mass of the saliferous shales, and need but the presence of water to combine them, and carry them into reservoirs beneath the surface by the simple act of percolation or drainage of the rocks.

6th. In accounting for the formation of anthracite, it is not necessary to take into the elements of our theorizing the action of a high heat to change bituminous coal into anthracite. Heat is capable of so doing. In North Carolina, a vein of trap cuts through bituminous coal. Now, trap, all admit, was once fluid through high heat, and where it is in contact with the coal it has changed it into anthracite. But other chemical agencies are equally able to effect this chemical transmutation of the relative proportions and combination of hydrogen and carbon. Professor E. Emmons has shown before the Philadelphia Academy of Natural Sciences, that cosmical chemistry with low heat has been the efficient cause of the metamorphism of bituminous into anthracite coal.

I will now proceed to state, in reference to the theory of your correspondent, that it is not necessary to suppose an evaporation into air of the gaseous products—hydrogen and carbon—attending the metamorphism of bituminous coal, and their subsequent condensation and deposition in distant geographical localities, to account for the geological position of mineral oils and the chemistry of their origin.

They are formed from the material existing in the shales holding the oils, and this material was derived from vegetation (marine or land) and animal matter, existing at the time the shales were deposited.

Oils, bitumen and coal are not confined to the carboniferous, but are found in all the sedimentary strata older and later than the coal. I give a condensed tabular view of the various geological formations acknowledged by American geologists, which yield either of the above-mentioned hydro-carbon products, proceeding from the recent to the ancient, and giving localities of their deposition.

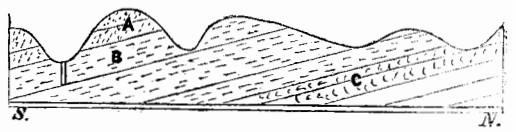
Table of Geological Formations in descending order, with Geographical Positions of Coal, Bitumen Oils and Gas.

RECENT FORMATION. Bitumen. Trinidad and Cuba.
TERTIARY. Bitumen and Coal. California and Oregon.
CRETACEOUS. Bitumen and Coal. Utah and New Mexico.
PERMIAN. Coal and Bitumen. North Carolina.
CARBONIFEROUS. Coal, Bitumen, Oil and Gas. Pennsylvania, Virginia, Ohio, Kentucky, Tennessee, Iowa, Illinois, Michigan, Rhode Island, Massachusetts and New Brunswick.
UPPER DEVONIAN. Coal, Bitumen, Oils, Gas. Virginia, Pennsylvania, New York, Ohio and Illinois.
LOWER DEVONIAN. Bitumen, Oils, Gas. New York, Canada and Pennsylvania.
UPPER SILURIAN. Bitumen Oils. Illinois, New York and Canada.
LOWER SILURIAN. Bitumen. New York and Canada.

By inspection of this table, at a glance the locality of oils can readily be seen, and it will be observed that they are found below the coal. In these localities and positions are found the oils of Meadville, Titusville, Kinzua, Cuba, Richmond, Mecca, and others in the northeast of Ohio, northwest of Pennsylvania and southwest of New York. They are all in the devonian.

The following diagram will illustrate their geological horizon:—The oil and gas springs of Kanawha, Va.; Coshocton and Yellow Creek, Ohio; Kiskiminitas, Pa., and other localities south of the northern out crop of the carboniferous, are in the true coal measures.

The following section shows the geological relations of the strata across the country from the gas springs of Ontario county, N. Y., to the oil wells of Pennsylvania; the inclination gives the dip of the strata southward:—



A is the carboniferous.

B, the devonian (upper), containing oil springs.

C, the devonian (lower), containing gas springs.

S, wells in the valley of the Allegheny and its tributaries, beginning below the coal and liquid oil.

R. P. S.

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AMERICAN ENGINEERS' ASSOCIATION.

[Reported expressly for the Scientific American.]

On Wednesday evening, Nov. 21st., the first regular meeting of this association, under the new constitution, was held at its room, No. 24 Cooper Institute, this city—Thomas B. Stillman, President, in the chair; Benj. Garvey, Secretary.

After considerable miscellaneous business had been disposed of, Mr. Gray, on behalf of the Committee on Science and New Inventions, presented the subjoined written report:—

Warren and Bank's Low Water Detector.—Your committee visited the place where the inventor had one upon exhibition, and were allowed to let the water down to the alarm mark, but no alarm was made; after touching the lever with the point of a knife blade, the alarm sounded. In view of the fact that an alarm, to be reliable, must always work well, or become a source of false security, we cannot report favorably thereon; we do not consider it reliable.

Ashcroft's Low Water Detector.—We examined this instrument at three different places. At the Astor House, where we learned from the engineer that, in his presence and that of our vice-president, the alarm had given warning with two cocks of solid water in the boiler. At the Bible House, where the same thing occurred; and at the Cooper Union, where we found the metal had commenced to corrode after but little use. In view of these facts, your committee cannot recommend it.

Hoyt's Water Gage.—We tried this instrument by letting down the water, but the whistle did not blow; not reliable.

Shrimpton's High Pressure Condenser.—Mr. Shrimpton claims that, by the heat of the exhaust steam, he can raise the temperature of the feed water to nearly that of the water within the boiler. Your committee had only a model in their possession, and therefore could not assert the contrary; but inasmuch as exhaust steam, without compression, can only pass 212° of temperature, we think it impossible to heat the feed water above that point. In relation to Mr. Shrimpton's other plan of passing the exhaust steam through a trough half filled with water, sufficiently long to condense all the steam, your committee say it is possible so to do, but do not believe it practicable.

At this juncture, so much of the above report as related to Mr. E. H. Ashcroft's instrument, was taken up and discussed by the several members present. Mr. Hart appeared for Messrs. Ashcroft & Co., and, for the benefit of those who had not seen the instrument, described it, and the manner of its operation.

DISCUSSION.

Mr. Merriam—The committee report the detector at the Astor House had operated as an alarm when there were two cocks of solid water in the boiler. During the first discussion of the merits of this instrument, it was suggested that, although water was a poor conductor of heat, yet, by its circulation, it became an excellent vehicle for the transmission of caloric upwards, and, consequently, it was feared that the water at the top of the detector would become gradually heated until it reached 212°, when the fusible plug would melt and give an alarm. Does not this report prove that deduction to be a correct one?

Mr. Hart—In this case, no. If the plug be not screwed up tight, or if, from any other cause, there be a leak in the instrument, the cold water will be gradually forced from it, and hot water will replace it and so melt the plug; this, doubtless, was the case at the Astor House, and proves, not that the detector is faulty in principle, but that it was not in proper order. In relation to the circulation of water in the tube, experiments tried by Mr. Ashcroft, with an instrument having a glass top, have clearly demonstrated that it never occurs, or to an extent so limited, that it never increases the heat of the water at the plug above 150°. If the detector be placed upon the top of the boiler, where there is but a little distance between it and the ceiling above, the atmosphere surrounding it is thus raised to a very high temperature, the plug will fuse from that cause alone. This instrument should never be so placed, but carried through the floor above.

Mr. Koch—Have you known other instances where a leak has caused the alarm to blow when there was sufficient water in the boiler?

Mr. Hart—I have, several; in fact, if the ball, packing or pipe leak, such a consequence would be inevitable.

Mr. Gray—As an engineer, then, I cannot recommend the instrument to my associates; for if, during the temporary absence of an employer, the alarm whistle should blow, I would be discharged, when, in reality, I may have kept my boiler well filled. The report of the committee was also upon the fusibility of the plug: we found the one at the Cooper Union corroded, and that after having been used but a few times. I dislike the idea of referring instruments back to the committee. We examined two of them, as requested by the owners, and found them both faulty. We reason, therefore, upon the fact that, in a low water detector, one case of failure in principle is sufficient to condemn it, inasmuch that one faulty instrument would do more damage than a hundred would do good.

Mr. Hart, during his remarks, alluded to the fact that the air at first compressed into the ball became, by contact with the water, absorbed; consequently, in a short time there would be no air remaining within the ball.

Mr. Simpson—Upon the first trial of the detector at the Cooper Union, in the presence of Messrs. Cooper, Renwick and others, the water was let down to the alarm point, when the whistle "hung fire" for a short time, and then blew; on being asked why this was so, the gentleman in charge of the instrument replied that, in order to be sure the pipe was full of water, he had not tightened the plug until the air was expelled, and therefore he believed that it was owing to the absence of a pressure of compressed air, to expel the water, that it remained so long in the tube. If his reasoning was correct, and what Mr. Hart says is true, then, after an instrument has stood for some time, the water will be held in the tube by the pressure of the steam.

Mr. Hart—Mr. Battles, the person Mr. Simpson alludes to, was wrong; he was not so well informed of the operation of the instrument then as now. The true cause of the tardy working was, on the contrary, the presence of that air in the instrument. You say it was just put up, consequently, the ball was full of compressed air, which did not descend with the water; therefore, the steam had first to displace the air before it could reach the plug.

Mr. Koch—Alloys change their fusible point upon being corroded; now, if the fusible point is constantly changing, we never can know when we are safe.

Mr. Hart—I should be glad if you would try the fusibility of the plug you have; put it in water at 212°, and you will find it to fuse in spite of the slight corrosion it may have.

Mr. Rhoeden—Such a trial would be very unfair; rather let it be tested with hot water or steam upon the side that is corroded. Besides, this plug has been but very little used, and we argue, from the corrosion already apparent, that six months would render it valueless.

Mr. Hart stated that Mr. Ashcroft would forfeit $1,000 for every plug made by him that would not fuse at 212°, after two years use.

At this period the subject was laid over for one week.

The society then adjourned.

FREE ADVICE TO INVENTORS.—It is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability without charge. Persons having made what they consider improvements in any branch of machinery, and contemplating securing the same by Letters Patent, are advised to send a sketch or model of it to the SCIENTIFIC AMERICAN Office, and obtain the opinion of the publishers as to the prospects of obtaining a patent. Such advice is rendered free by the publishers of this paper, who have had fifteen years' experience in the examination of inventions and the procuration of patents.

THE BEST VIOLIN IN THE COUNTRY—So say, as we are informed, some of the most prominent musicians, referring to the instrument now in possession of Capt. John Brooks, of Bridgeport, Conn. It is a genuine Cremona, made by Nicholas Amati, and is valued at $1,600.

LOSS OF LIFE BY STEAMBOATS IN 1860.

EXPLOSIONS—SIGNALS.

The number of lives which have been lost by explosions on board of steamboats during the present year has been much less, we are happy to state, than during any previous year since the new law of Inspection went into operation. The total number of deaths from all causes was 474, as follows:—

By explosions, 80; 46 passengers and 34 crew. We will also include the recent explosion of the *H. R. W. Hill* at Baton Rouge, where 45 lives were lost.

By collisions, 308; 301 passengers and 7 crew. This includes the *Lady Elgin*, in which 300 were lost on Lake Michigan.

By fires, 41; 18 passengers and 23 crew.

These statistics have been obligingly furnished us by one of the principal inspectors. Deducting the loss by the *Lady Elgin*, all the others amounted to 184 only; but to this we have now to add the explosion of the propeller *Globe*, which took place on the 8th ult. at Chicago, by which 13 persons were killed and several others severely wounded. This occurred while the propeller was lying at the dock, and getting up steam for the purpose of hoisting out freight. The explosion is stated to have been caused by pumping water into the boiler when it was overheated by the water getting below the safe water line. The indicated steam pressure was low, and the amount of water small. This explosion seems to afford a fact opposed to the late theory regarding explosions being caused by the sudden increase of pressure in a boiler when the temperature of the water is above 212° Fah.

The explosion of the steamboat *H. R. W. Hill* was of a remarkable character. The pressure of steam carried was 120 lbs. The boiler head was forced out from the upper part and doubled over at the middle, presenting the appearance of a circular book cover, half closed. The steam and *water* first rushed out at the open part of the head, and escaped upward, breaking the floor of the saloon; then, when the boiler head was further bent over by the pressure, the steam and water took a horizontal direction, and dashed violently over a tier of cotton bales where 45 persons—deck passengers and some of the crew—were sleeping. The loss of life in this case was not exactly caused by what is understood to be an explosion (the boiler suddenly bursting into pieces) but by a rupture of the boiler head, which, it is stated, bore the marks of an old crack. This case is also at variance with the recent theory on boiler explosions, as the heat of the water in the boiler was 345° Fah., and should have all flashed instantly into steam, instead of flowing out of the ruptured head. Other facts, which may be developed at the investigation before the Inspectors, may modify this opinion.

It will be observed that, out of the total of 487 lives lost on steamers—including the propeller *Globe*—no less than 308 were due to collisions, and these were caused by sloops carrying no signals. Collisions on sea and on inland waters have become the greatest source of anxiety and danger. This would not be the case were a compulsory good system of signals adopted. Sloops carrying no signals are the principal evil spirits of darkness which cause collisions. This was the case with the melancholy affair of the *Lady Elgin;* and, no later than the night of the 10th ult., the steamer *James Adger* run into a schooner which showed no lights off Absecum, N. J. It is quite common for sloops and schooners navigating our seas and rivers to run at night without a single *glim* to indicate their course or presence; and when a steamboat comes snorting up into dangerous proximity, there is usually a desperate rush made to display a tallow candle at the bow or stern. The steamboat inspectors have endeavored for a considerable period of time, to introduce an efficient system of signals, and what is wanted to give it force is an act of Congress, which we hope will be passed at the next session.

THE LONDON CHEMICAL NEWS.—We presume that the failure of this respectable journal to give credit for the editorial on the "Field for Chemical Inventions," which it extracts from our paper, is owing to one of those inadvertences which occasionally occur in the best regulated establishments.

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ROMANCE OF THE STEAM ENGINE

NUMBER I.

The mighty giant, steam by which we spin, weave, plow through the ocean, drive the rail car, print our newspapers, and perform a thousand other operations, did not attain to its present harmonious and herculean proportions by a sudden burst of genius, like the flash of a meteor across the darkened horizon. It has had its years of childhood and youth, like all other great inventions. Its history extends backwards for thousands of years, and is full of romantic incident. We propose, and now commence, to give a series of sketches illustrative of the lives and efforts of its early inventors.

HERO.—Egypt has been called "the cradle of the arts and sciences," and perhaps with much justice. Several of her ancient mechanicians constructed machines which afforded evidence of great ingenuity; and Hero of Alexandria was no doubt the inventor of the first steam motor. He was the son of a Greek, and lived 120 years B. C. At an early age, he devoted himself to geometry and mechanical pursuits. He left behind him a record of his inventions, in illuminated manuscript, and therein is described the fountain for raising water by compressed air; the mode of forming a vacuum by sucking air from a vessel, and also of producing a blast by falling water. He describes thirteen problems in which he operated with heated air and water. In two modes the doors of a temple were opened and closed by means of rarefied air; in another, wine was made to flow, by the same means, upon a sacrificial fire, to assist combustion; and by another method, he made a small stage revolve with automata upon it. He describes three modes by which steam was used directly as a mechanical power, viz: to raise water by its elasticity; to elevate a weight by its expansive power, and to produce a rotary motion by its re-action on the atmosphere—a rotary steam engine. These three modes of applying steam are illustrated by the accompanying figures.

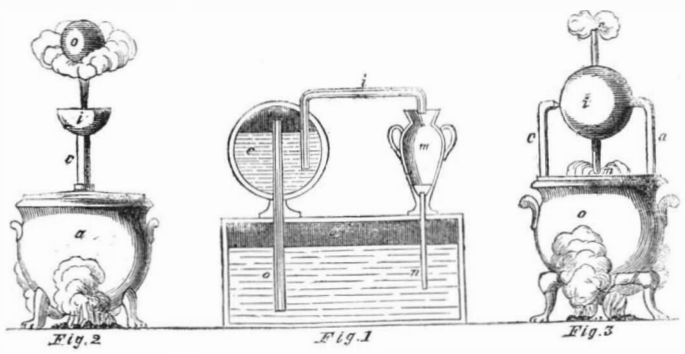
Fig. 2 Fig. 1 Fig. 3

On the lid of the cistern, *a*, Fig. 1, Hero placed a globe, *c*, also partly filled with water; a pipe, *e*, rises from the cistern into the globe; another pipe, *i*, proceeds from the globe, terminating over a vase, *m*, and this commuicates with the cistern by a pipe, *n*. When the beams of the sun fell upon the globe, they heated the water and generated vapor, which, by its expansion, forced the water through the siphon, *i*, then it trickled into the vase, and was again conducted into the cistern by the pipe, *n*. When the beams of the sun were shut out, the surface of the globe became cooled, the vapor within it was condensed, and a vacuum was left in the upper part; the pressure of the atmosphere then forced the water in the cistern up the pipe, *e*, to replenish it, and the same operation of forcing water commenced when the rays of the sun were again permitted to fall on the surface of the globe and heat its contents. This apparatus never got beyond the character of a toy, but Hero was operating here with the great powers of nature.

In Fig. 2, the heat of a lamp or fire is shown as applied to generate steam. A vase, *a*, has a pipe, *c*, inserted into its lid, which is formed at the upper end like a small cup, *i*, and which contains a hollow ball, *o*. A fire being made under the vase or boiler, the steam rises from it through the pipe, *c*, lifts the ball placed in the basin, and keeps it suspended in the air as long as the steam rises with a proper velocity from the vase, *a*. This was a very ingenious steam toy.

Fig. 3 represents Hero's steam master-piece. *o* is the vase or boiler containing water, and a fire is applied to its bottom. Two pipes, *a c*, rise from the cover of the boiler; the one, *c*, acts as a pivot, and the other as a conductor of steam into the interior of the hollow sphere, *i*. Two pipes, *m n*, bent at right angles at their extremities, are inserted into the globe. The steam flowing up through the pipe, *a*, into the globe, and seeking exit by the hollow arms, *m n*, by its re-action "made the globe revolve with magical celerity, as if it were animated within by a living spirit;" so said the old philosopher. This was the first steam engine—a genuine rotary—and it has frequently been imitated within the past fifty years by substituting a hollow wheel for the globe. It is also the parent of the famous Barker mill, which although operated by water as a substitute for steam, is in all other respects Hero's identical engine.

It is a great wonder that Hero was not led to a practical and useful application of steam to the saving of labor. There is no evidence left that it was ever anything but a toy in his hands. This may be attributed to the bigotry and false notions which the ancient philosophers entertained regarding the dignity of philosophy. They considered that such knowledge, when shared by common minds, was degraded; hence they concealed many of their discoveries rather than expose them to the people, whom they considered ignorant and vulgar. This accounts for the obscurity which hangs over many of the ancient arts.

THE NAVAL COMMISSION UPON THE EXPANSION OF STEAM—WHAT THEY PROPOSE TO DO.

We have already noticed that a commission has been appointed by the Secretary of the Navy to test, upon a large scale, the advantage or disadvantage of using steam expansively. The members composing that commission are Messrs. B. F. Isherwood, Theo. Zeller, Robt. H. Long, and Alban C. Stimers, all chief engineers in the naval corps, and Capt. Joseph Lanman, executive officer of the U. S. steamer *Michigan*.

That our readers may more clearly understand the reasons for such an extended series of experiments as are in contemplation, it will be well to state briefly that Mr. Isherwood, during the last Spring and summer, made numerous experiments at No. 239 Cherry street, this city, on a small condensing engine, constructed purely for experimental purposes, with a view to ascertain the comparative economy of using steam with a peculiar method of superheating. In the course of these experiments it became necessary to greatly vary the conditions under which the steam was used, in order to determine whether the same results from the superheating followed with every variation in the condition of the steam. Accordingly, amongst others, an extensive set of comparative experiments were made with the steam used expansively, and without expansion; when, to the surprise of those in charge, it was discovered that no economy followed the use of expanded steam, even under the most favorable circumstances.

These experiments being made upon a single horse power engine, it was thought by many of our engineers and large manufacturers that the facts there attained would not hold good when tried upon a more extensive scale; consequently a petition was sent to the Hon. Isaac Toucey, Secretary of the Navy, requesting the government to try the experiments upon a large scale. With an alacrity highly commendable, and such as he has ever evinced in advancing the cause of engineering in this country, he appointed the present board.

The U. S. steamer *Michigan*, now in winter quarters at Erie, was placed at their disposal, and it was decided that the experiments should be commenced forthwith.

This steamer has very recently been supplied with two new boilers of the Martin vertical tubular description, and her machinery has been thoroughly repaired under the personal supervision of Chief Engineer Zeller. Her engines are of the same plan, and very similar to those of the *Harriet Lane*; they were designed by Mr. Charles Copeland, and constructed by Messrs. Stackhouse & Tomlinson, of Pittsburg. The cylinders are 36 inches in diameter; length of stroke of piston, 8 feet, and the wheels are 21 feet 6 inches in diameter. The floats are in two parts, 17 and 14 inches wide by 8 feet in length; dip of wheels, 27 inches, when the steamer draws 7 feet of water, which draft she is designed to have during the experiments.

The *Michigan* is constructed of iron, but the framing of her engines is wood. Her principal dimensions are as follows:—Length, on deck, 163 feet 6 inches; breadth of beam, 27 feet; depth of hold, 12 feet; she is the only U. S. steamer on Lake Erie.

The instructions of the board are that both engines be fitted with indicators, and a tank supplied for measuring the feed water, previous to its being pumped into the boilers from the hot well. The coal to be used is the bituminous, from the Ormsby mine; this is to be carefully weighed, together with the clinkers and ashes. Observations are to be made every hour, and the number of revolutions, steam pressure, vacuum, barometer, temperature of tank, injection water, engine and fire-rooms, are to be carefully noted. Indicator diagrams at each end of the cylinders, and the evaporating qualities of the boilers, with the amount of steam generated to each pound of coal, both by indicator and tank measurement, are also to be made. The pressure in the boiler is to be kept, as far as possible, at 20 pounds per square inch; the dip of the wheels to remain the same during the whole course of the experiments. The throttles are to remain unaltered during each experiment, and the number of revolutions to continue, as far as practicable, the same. Each experiment is to occupy seventy-two consecutive hours, and they are to be made in the following order:—

1st. Both engines cutting off at one-quarter stroke.
2d. Both engines cutting off at one-half stroke.
3d. One engine cutting off at one-half stroke.
4th. One engine cutting off at three-quarter stroke.
5th. One engine cutting off at full stroke.

Additional clauses, incorporated within the general order, give the board power to experiment further upon such points as they may deem necessary, and verbal instructions leave them no alternative but to use every possible exertion, and employ all their time to arrive at positive conclusions upon the subject.

The board, amongst others, design to experiment upon the following points:—The friction of the engines by removing the floats and running without them; the comparative effect of working with low steam, full stroke, by reducing the initial pressure, and by cutting off at two-thirds the stroke.

The high official character of the members composing this board is such that we can safely vouch that their numerous experiments will be conducted with the greatest care, and that the various points upon which they must decide will be treated in an able and impartial manner. We have the assurance that they enter upon their duties designing to arrive at the truth, and it only.

Many persons who deny that there is any economy in working steam expansively, quote Mr. Isherwood as authority in support of their position; this gentleman does not seem to be rightly understood upon this question. He does not deny that there is any economy in thus working steam; on the contrary, he recognizes this economy fully, but he does contend, that from the various experiments he has already made, the advantages thus gained, are neutralized by the greater friction of the enlarged cylinder necessarily employed, the increased back pressure upon the larger piston, and the condensation of the steam by expansion.

These experiments will command universal attention, and we, among many others, will anxiously await the development of the result to be attained. Further, we trust that all engineers, manufacturers of machinery, &c., &c., will avail themselves, as far as practicable, of the kind invitation of Mr. Toucey to be present at some if not all the experiments that are to be made. We can assure them they will be received with kindness by the gentlemanly board now in session.

THE copyright of Webster's Dictionary yields $30,000 a year; and of his "Elementary Spelling Book" 35,000,000 of copies have been sold, the annual issue now being upwards of 1,000,000.

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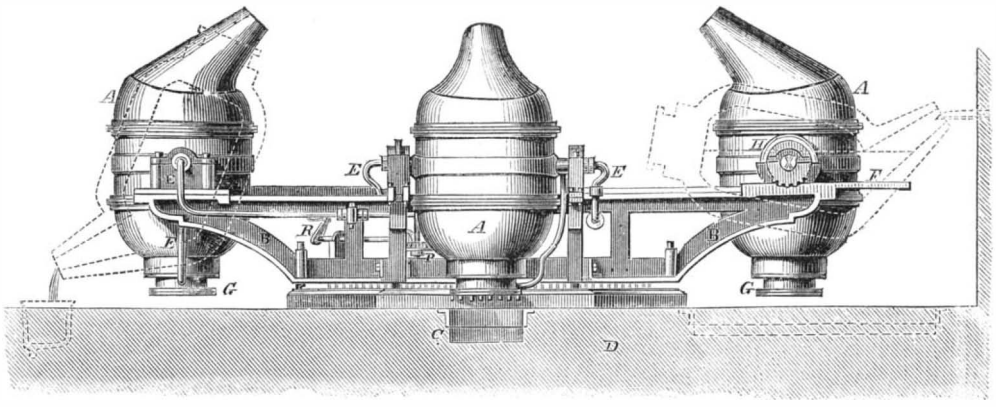
IRON AND STEEL IMPROVEMENTS.

Our readers may remember the excitement created in 1856 by Mr. H. Bessemer, of London, who secured an English patent for making malleable iron and steel direct from the ore, by a continued simple process, which was illustrated on page 32, Vol. XII. (old series) of the SCIENTIFIC AMERICAN. The principle of the invention consisted in forcing a stream or streams of air or gases through molten crude iron in a suitable vessel or apparatus, by which process the oxygen of the air was made to combine with the excess of carbon in the metal, forming carbonic acid gas, which passed off under a great heat, leaving the pig iron purified and converted either into malleable iron or steel, according to the amount of oxygen that had combined with the carbon. It was afterwards proved that other persons had been making experiments in the same direction, in this country, before Mr. Bessemer, but he was the first who directed public attention in a general way to the interesting and important subject. The theory of obtaining good malleable iron and steel direct from the ores, by one continued process, in the manner described, is not unreasonable, and whenever this is successfully attained, a great revolution will certainly take place in all the arts, because malleable iron and steel will then be reduced to about one half their present prices.

It has been asserted, several times, that this process was a failure, but we understand it is successfully carried out in one of the greatest Swedish iron works, and Mr. Bessemer himself seems to be convinced of its practicability and value.

The accompanying engraving is a side elevation of improved machinery recently patented by Mr. Bessemer, for conducting his process, which has been illustrated in the London *Engineer*. The illustration represents three "converting" chambers, which are so situated in a strong iron framing, and so constructed and operated, that one is tipped in such a manner (as shown by the dotted lines) as to receive the molten crude iron. It is then raised to a vertical position and a stream of compressed air forced upwards through it, when a violent ebullition of the metal takes place, and the excess of carbon is removed. It is then turned round and tipped on the opposite side of the frame, and the refined metal flows out into a proper vessel set for its reception, to be used for running into bars, &c.



BESSEMER'S APPARATUS FOR REFINING IRON.

A A A are the conical converting vessels into which the molten pig iron is received, and into which the air is forced, for refining purposes. They are secured in a very strong iron framing, and each is supported on trunnions at the sides. The whole frame is secured to a strong vertical shaft, C, in the center, on which they are made to revolve, as required, like a turn-stile. In this manner, each is alternately brought forward to receive molten pig iron from the smelting furnace by a spout, and then made to deliver the refined iron, as is shown by the dotted lines. The mechanism is secured to a solid foundation plate, D, and B B are the arms of the iron frame. G G represent the tweers at the bottoms of the converting vessels; they are lined with fire brick, and each has a number of circular air passages in it. E E E are the pipes down which the air is forced, first through the hollow trunnions, H H H (one on each vessel), which keeps them cool, then into the tweers, G G, and up through the molten metal in the converting vessels, A A. There is a toothed segment on one trunnion of each chamber, which takes into a rack, F. When this rack is moved back and forth, it gives a semi-rotative motion to the chambers, as shown by the dotted lines. Mr. Bessemer employs a hydraulic pump to operate the rack bars, F, and in this manner he secures a very simple and effective method of tipping the converting vessels. A ring of cogs is bolted to the frame of the central axis, and into this there gears a pinion which is rotated by the crank, R. In this manner the entire framework and mechanism are rotated on the central axis, and each converting vessel has a motion on an axis of its own.

By knowing the exact weight of molten pig metal in each converting vessel and the amount of carbon (generally about 3 per cent) in it, the exact quantity of air can be forced through the metal, to reduce it either to steel or malleable iron. In this manner the blast regulates the quality of the product. Great exactness in the operations is required to produce the quality of metal required. The number of cubic feet of air that passes into the vessels is registered by a counter, and the blast cylinders and hydraulic pumps are operated by two high pressure engines which are not shown. The furnaces in which the pig iron is smelted are so situated above the frame, that the molten metal will flow into the vessels, as represented at the one side.

This apparatus or mechanism is an improvement in the details for carrying out the principle set forth in Mr. Bessemer's first patent. No new scientific discovery is set forth in the one which he has lately taken out, and none is required. The principle is well understood and, in our opinion, progress is being made for the perfect manufacture of iron and steel direct from the ore. The common practice of running off and cooling crude iron, when it is made in the smelting furnace, then re-melting it in a reverberatory furnace, for refining purposes, deserves to be condemned. The great labor and trouble involved in running it into pigs, and the expense entailed to re-melt it, will yet be all saved. The heat of the molten pig metal, as it comes from the furnace, can and should be utilized by such a process and arrangements as those we have illustrated and described.

COAL OIL.

When bituminous coal is placed in a retort and heated, it undergoes destructive distillation; that is to say, the elements of which it is composed are separated from each other, so that the substance is no longer coal, but is transformed into a number of other substances, twenty of which have been already separated and examined. Of these twenty, three are oils—*benzole*, *toluol* and *cumol*.

Benzole possesses peculiar properties which render it valuable for many purposes in the arts. It is a powerful solvent of gums, resins and fats, which property, besides rendering it useful when solutions of these substances are required, makes it a very efficient detergent for cleaning cloth, leather, carpets, &c., from spots of grease, resin and tar. It causes no injury to the color, and leaves no odor in the fabric. Benzole is the lightest and most volatile of the oils obtained from coal, its boiling point being 186°.

The coal oils of commerce which are employed for lubricating and lighting purposes are principally mixtures of toluol and cumol, generally containing impurities; the heavier oils containing a larger proportion of cumol, and the lighter a larger proportion of toluol. A comparison of the boiling point and composition of these three oils is shown in the following table:—

	Boiling point.	Composition.
Benzole	186°	C12 H6
Toluol	237°	C14 H8
Cumol	314.5°	C18 H12

It will be seen that they are all composed of carbon and hydrogen. As there is a large class of organic products which differ from each other in composition by the amount of two atoms of carbon and two of hydrogen, and as the existence of another oil between the cumol and toloul, with the composition of C_{12} H_{10}, would cause the series of coal oils to vary from each other, according to this law, it is supposed that there is probably such an oil which has never been separated.

In the distillation of the coal, the lighter and more volatile oils come over at the lowest temperature, and as the temperature rises those which are heavier and less volatile are obtained. If the retort is too highly heated, the coal is mostly decomposed into permanent gas, which cannot be condensed into liquid oils. The products obtained by the destructive distillation of oil vary very much with the temperature of the retort, and one of the principal objects of using a rotating retort is to keep all of its contents at the same temperature.

Coal oil is far superior to any other for lighting purposes; it produces the whitest and most perfect of all artificial lights. It is also unobjectionable on the score of cleanliness; if lamp oil is dropped upon a carpet, it makes a dingy spot, but coal oil, on the contrary, makes the carpet cleaner. Nearly all organic substances absorb oxygen and decay; lard oil, whale oil, butter, &c., become rancid by the absorption of oxygen; but as pure coal oil does not absorb oxygen, it never becomes rancid nor decays. As this oil contains no oxygen, it is a perfect protection of any metal immersed in it from rust, and hence it is particularly adapted for oiling cutlery, &c. As the community becomes more familiar with its peculiar properties, the number of its uses is constantly increasing, and consequently the demand for it is being steadily enlarged.

It is probable that many substances will be derived from coal besides those at present known, and that the applications of this most valuable commodity will be largely increased.

AFRICAN RAILROAD—A CAFFRE RACE.—The war of railroads has been carried into Africa. In the month of June last a railroad was opened for connecting the colonies of Natal and the Cape, on which occasion there was a grand assemblage ol wondering Caffres to see the iron horse for the first time. The engineer intentionally run his engine at first very slowly, when quite a crowd of the athletic, swift-footed sons of the desert thought they would try the steam horse a race. Onward they went together for about two miles, the woolly heads and long, nude legs getting close to the front, when they yelled with defiant exultation at beating the steam *devil*, as they called the locomotive. At this place the embankment, which before was somewhat wide, now became high, narrow, and steep. The spirit of the iron horse was now fairly aroused, so giving three tremendous snorts, he started off at the rate of thirty miles per hour. The last act which the roguish engineer saw the dusky runners perform, when he looked back, was the sudden execution of a series of ugly somersaults on the top of one another down both sides of the embankment.

ORIGIN OF COAL OIL.—On another page we present an interesting article on the "Origin of Coal Oil," from the pen of Dr. R. P. Stevens, of this city, which will be found well worthy the attention of all classes of our readers. Dr. Stevens not only evinces a knowledge of the subject on which he writes, but he has dealt with it in so lucid and popular a style as to render the article interesting even to the non-scientific reader.

LIBERIAN bloodhounds are raised in Myrtle Avenue, Brooklyn, by F. Butler, who carries on the raising of dog stock upon a scale as extensive as some of the largest cattle raisers in the West. A full-sized Liberian bloodhound is valued at $1,000; they are splendid animals, and become as large as some lions.

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TALK WITH THE BOYS.

No. 8.—The Way we Digest our Food—The Stomach—The Liver—The Way the Food is Poured into the Blood and Carried over the System.

"Good morning, Charles. Good morning, John. To-day we are to take a glance into our own stomachs, are we?"

"You don't mean literally, I suppose, but by some mysterious scientific investigation."

"It has been done literally, in one case at least. However, let me tell you first what is known about the movements of the food after it passes into the body, and then perhaps I can give you some idea of the mode in which the facts have been learned. The stomach is a bag, lying pretty nearly across the middle of the body, a little to the left, of a size sufficient to hold about a quart. As the food is swallowed it passes through a long, flexible, moist tube, called the esophagus, and falls into the stomach. The presence of food in the stomach stimulates the gastric glands to secrete the gastric juice. These glands are situated in the inner coating of the stomach, they are very numerous and exceedingly small. The gastric juice which they secrete partially dissolves the food, converting it into a semi-fluid mass, called chyme. In order to mix the gastric juice thoroughly with the food, the stomach has an instinctive movement which carries its contents along its greater curve and returns them by the lesser, mixing them by a churning motion, occupying about three minutes in each revolution. Thus the food is frequently presented to the passage from the stomach in the duodenum, and, by one of the most wonderful of all the mysterious adjustments that we find in the operation of the human system, as soon as any portion of the food which is thoroughly digested presents itself to this passage, the passage opens and allows the chyme to flow out into the duodenum. When food not perfectly digested is presented, the passage refuses to open, and thus the food is retained in the stomach until all of it that can be converted into chyme is so converted. After indigestible matter has been presented several times to the pyloric orifice and returned to the stomach, the passage finally opens, and all the contents of the stomach flow out into the duodenum."

"How does this passage know whether the food is digested or not."

"That is another of those questions which it is easy to ask but impossible to answer. Nobody knows."

"Well, how do they know that these motions do take place?"

"Some years ago a soldier in Canada was wounded in the stomach by a bayonet, and when the wonnd healed, it left an opening into his stomach by which persons could look in and see the operations of digestion going on. Dr. Beaumont, of St. Louis, took this soldier, St. Martin, under his care, and made a long series of investigations of the process of digestion. He had a little silver ladle made, and used to dip out the gastric juice and try its action on meat and other substances outside of the body. But with this wonderful opportunity he did not discover much which had not been previously known, a fact which proves, in a very striking manner, the thoroughness of the physiological investigations which had been made before."

"We will believe your statements, then. What takes place next?"

"The proper way is to receive the present conclusions of science till you acquire sufficient knowledge of the subject to test them for yourselves. You will find that it will take very careful and laborious experiments to disturb these conclusions. After the chyme has passed into the duodenum, it is mixed with two other fluids, which dissolve it further and convert it into a milky liquid called chyle. These two fluids that mix with the chyme are the bile, which is secreted by the liver, and the pancreatic juice, which is formed by the pancreas. From the duodenum, the chyle, mixed with the waste indigestible portions of the food, passes on through the jejunum into the small intestines, which, in man, are about 15 feet long, and are folded back and forth in the lower part of the abdomen. This is the gut which, in the hog, is used for making sausages; being air tight, it preserves the meat which is stuffed into it from decay. Along the small intestines are numerous mouths which lead into very small tubes or ducts, by which the chyle is sucked in, as it flows along through the intestine, and these tubes meet, like the branches of a river, till they form one large pipe or duct, which leads up by the side of the back bone carrying up the chyle and emptying it into a large vein in the left side of the neck, by which it is borne directly to the heart and distributed over the system. The little tubes which suck up the chyle from the intestine are called lacteals, and they have the power of rejecting the undigested waste matter, which accordingly continues on its course, passing through the colon, up the right side, across the body just under the stomach, down the left side, and out by the rectum."

"I thought you were going to tell us about the action of carbonic acid in our bodies."

"I was, but thought it best that you should have first a general notion of the mode in which nourishment is supplied to the system. I will next explain to you the way in which a portion of this food is used as fuel to heat our bodies, but as this will take some time, we will postpone it till next Saturday."

IMPROVEMENTS IN LOCOMOTIVES—FEED WATER HEATING.

We find the following remarks in the editorial columns of the London *Engineer*:—

Reverting for a few lines to the superheating of steam, it is tolerably evident that the difficulties opposed to the successful introduction of superheated steam are to be found chiefly in leakage and deposit of sediment in the superheating tubes, and the erosion to which metallic surfaces, thus exposed to high temperatures, are liable. For the prevention of deposited sediment or other impurities in the steampipes, we must either have recourse to pure water or to surface condensation and distilled water; the prevention of sedimentary deposits, of course, instigates the external erosion, as the overheating of pipes, which is the cause of such action, is in a great measure prevented by the comparative freedom with which heat is conducted through an unobstructed metallic medium. Another cause of difficulty in the superheating apparatus is the unequal expansion and contraction to which the parts of the apparatus are subject. It appears that, on board the Woolwich steamboats, the saving of fuel by superheating the steam is found to average from 15 to 20 per cent; but it is considered upon the whole questionable, whether the extra cost of maintenance, due to the application of the superheating process, is materially less than the saving. It is, however, without doubt, established that, with a working pressure in the boiler of 20 lbs. or 21 lbs. per square inch above the atmosphere, the proportion of fuel saved by superheating the steam is from 15 to 20 per cent on board those steamboats. That is one point gained, and it is for engineers to secure the entire saving, by improving their details, simplifying the apparatus, rendering every square inch of superheating surface more effective than before, and superseding the additional maintenance heretofore expended.

With respect to feed water heaters operating by the means of the exhaust steam, they are either surface-heaters or heaters by direct intermixture; and the latter must be allowed to be, in all respects, the most convenient, the most compact, the most efficacious—in short, the best surface-heaters by waste steam, like those by the waste gases, require a large extent of surface for the absorption of a sufficient quantity of heat, involving an arrangement of concentric pipes, or faggots of tubes, or similar expedients for eking out the needed surface, to the painful violation of the principles of taste in design, and to the grievance of the manufacturer who studies simplicity in all his works. Some inventors will work ten times as hard as others, and the fruit of their labors will be a design ten times more complex. Given—any quantity of tubes, a rather extensive supply of cocks, in various shapes, with from one to four passages in and out, a few dozen union-couplings, and a gross of bolts and nuts, and inventors are to be found who will not only scheme a feed water heater out of these materials, but who will use them all up, or "bring them all in." But as the cost of making, maintaining and working an engine, may be taken to be in the ratio of its weight, it is no doubt better to dismiss complications, or to seek for permanent arrangements in things which are simple, direct and to the point.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported expressly for the Scientific American.]

On Thursday evening, Nov. 22d, the usual weekly meeting of the Polytechnic Association was held at its room in the Cooper Institute, this city; Professor Mason presiding.

MISCELLANEOUS BUSINESS.

Stoneware Post Butt.—Mr. James Holland exhibited and explained an invention for securing wood that is planted in the ground—as fence posts, telegraph poles, &c.—from decay. It consists of a stoneware covering for the end of the post, which is to be set in the earth so that its top shall be about an inch above the surface. The post is then placed in it, and the space around the post thoroughly filled with pitch. The material is composed of fire clay and sand (any kind of pottery clay will answer), dried, and then burned in a kiln until perfectly dry and hard. Not being porous, it excludes all moisture from the wood, and thus obviates the cause of decay.

Mr. Dibben inquired whether the dwelling of the wood upon the absorption of moisture would not split the butt; and remarked that it is a common practice to split stones by drilling holes, driving in wooden plugs, and then wetting them.

Mr. Holland said that for that purpose a porous wood—such as willow—would be used. There would be no danger of these being rotten from that cause.

The President inquired what was to prevent the pole from rotting off just at the surface, immediately above the stone.

Mr. Holland said that the pitch would be a sufficient protection there.

The President inquired why, then, the pitch would not be a sufficient protection underground.

Mr. Garvey said that the stone covering was to keep the pitch from scaling off when the wood is swelled by moisture. The wood must be thoroughly painted above the ground.

Mr. Dibben inquired whether the inventor would be willing to put one into a pail of water with the wood unpainted.

Mr. Holland—Yes, sir; I have done it before witnesses.

Mr. Garvey suggested that Mr. Holland furnish specimens for trial by Mr. Dibben's test.

Mr. Holland agreed to do so.

Gold Washers.—Mr. Bruce exhibited a beautiful specimen of quartz gold, sent from California by the last mail.

The President exhibited a specimen of gold gathered from tailings which had been rejected as utterly incapable of yielding anything valuable. Upon running ten bushels through a new machine, a quantity of gold worth 9½ cents to the bushel was separated. Two men with five of these machines would obtain a clear profit of about $25 per day. It is done, as usual, by the aid of mercury.

Mr. Wood said that a friend of his expected far greater profits from a machine which he had invented, without using any mercury at all.

Mr. Dibben said that it had been found that tailings, after atmospheric exposure for some years, would be so changed that they could be worked profitably.

The President cited the case of a man who had earned $3,000 in California in a single year by working old tailings by the old methods.

Personal Explanation.—Mr. Seely offered a resolution with reference to remarks which he considered as implicating the integrity either of an officer or member of the association.

The regular subject—"Sewing Machines"—was then introduced.

DISCUSSION.

Mr. Babcock said that the sewing machine had been called the miracle of the present age. Twenty years ago, the practicability of sewing seams by machinery was considered as out of the question. At the present time, tens of thousands of sewing machines are in daily operation, sewing rapidly and with perfect success. This has, of course, occasioned a considerable degree of suffering and want, by depriving the poor seamstress of her former means of support; but the amount of suf-

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ring has been smaller than would have been expected from the introduction of so large a number of machines. And, in the end, we have every reason to suppose that it will be of advantage to the poor. While it will reduce the cost of manufacturing clothing, it will raise the price of labor, in the same manner that cotton machinery has raised the price of labor of cotton operatives. When the first spinning jenny was invented, a riotous mob destroyed it because it would destroy their labor; but the descendants of that mob are enjoying the benefits of the invention in an increased price of labor and a decreased cost of the necessaries of life. This great boon of society is the result of a large number of inventive minds. The name of Howe, Hunt, Wilson, Singer, and hundreds of others, will be handed down to posterity and be reverenced by them as the introducers of this great improvement.

Dr. ——— (a surgeon) remarked that the sewing machine needle, with the eye at the point, was first employed in surgery for taking up and tying arteries.

Mr. Johnson suggested that it would be well to commence with the historical bearings of the subject.

Mr. Dibben said that old machines could be found which made the same show as many of the modern ones, but not for the same purpose or with the same practical effect. The lockstitch was made by machinery long before Howe made it; but it was made for ornamental purposes. And Howe has gained, before the highest tribunals of this country and of England, the sure credit that he was the first inventor of a practical apparatus for sewing seams by a sewing machine. In 1850, the inventive talent of the United States began to ruminate whether they could not improve upon Mr. Howe's sewing machine. Mr. Bartholf made a machine with a pointed needle and a shuttle running in a circle of about a foot diameter, with a reciprocating needle. Mr. Singer began in the Bowery, with two or three machines; Mr. Wilson, of the firm of Wheeler & Wilson, brought out several new ones; and Mr. Grover, of Boston, invented a different kind for different work. The first good show of practical sewing machines was made at the Crystal Palace Exhibition and World's Fair in New York. At first, there was a hue and cry that the work ripped, and was inferior to handwork. But now the poorest sewing machine work is equal to the best handwork.

The President inquired whether all the subsequent machines worked under Mr. Howe's patent.

Mr. Dibben replied that, in this country, they are all amenable to Mr. Howe, although some of the manufacturers of the cheap machines shirked the payment to him of his patent fee.

The President inquired what inventor, next to Mr. Howe had devised an improvement especially important to the final result.

Mr. Dibben—The next practical men to whom the public owe their gratitude were Mr. A. B. Wilson, Mr. Grover and Mr. I. M. Singer. These three men have done the most.

The President inquired what was the first important improvement upon Mr. Howe's machine.

Mr. Wood (to whom Mr. Dibben yielded the floor) considered the rotary hook and feed, invented by A. B. Wilson, as the first. The invention of Mr. Howe consisted, not in a needle, but in the formation of a seam by the union of two threads, by the combined action of an eye-pointed needle and a shuttle or other attendant apparatus. Although previous machines put threads into cloth, it was not in the form of seams, but for other purposes; and they had no apparatus for holding the cloth. In Mr. Howe's apparatus, the needle was placed in an arm which moved horizontally, and the cloth was suspended from what was called the baster plate. The needle, with the thread through the eye near the point, was passed through the cloth. A loop was formed, and a shuttle upon the other side, containing another thread, was passed through that loop. The needle was withdrawn, and the threads were interlocked. That was the way in which Mr. Howe formed the stitch.

The President—Did Mr. Howe accomplish the lockstitch?

Mr. Wood—He did.

The President—That was the main point to accomplish, was it not?

Mr. Wood—It was. His feeding apparatus consisted of a rack upon the machine with pins resting upon it, upon which was suspended the cloth. The cloth was carried forward at each stitch. The objection was that you could only sew straight seams, in the line of the baster plate. The next step in the improvement of the sewing machine, I think, was putting the cloth upon a table, and moving it by an endless feed; for, with the baster plate feed, the work was carried along as in a sawmill, and, when one straight edge was sewed, was replaced to be carried along again. Mr. Wilson's feed consists of a feed bar, slotted at some length, with a tongue playing in the slot, with points at the end of the tongue for holding the cloth; the whole is moved by proper mechanism below, so that, as the cloth lies beneath the needle, these teeth are raised and punctuate the cloth, then carry it forward to the proper length of a stitch; and then, as the needle penetrates the cloth, the points drop, leaving the cloth free, excepting as held by the needle, while the feed bar moves back ready for another stitch. This is called the reciprocating or four-motion feed. Mr. Wilson's earlier invention was the two-motion feed, which was objectionable because it always held the cloth so that it could not be turned to sew curved seams. With the intermittent action of the four-motion feed, the cloth may be turned upon the needle, while the feed bar is moving back, so that a skillful operative may write his own name with the seam.

The President said that the invention of the feed seemed to him to be due to a boy in Rhode Island, who was tending looms in a cotton mill, and made a similar contrivance to enable him to read to better advantage while at his work.

Mr. Wood remarked that it was very unfortunate for the opponents of Messrs. Wilson and Howe that they had not known of this boy. The next important point in this machine is the rotary hook. In Mr. Howe's invention the shuttle was used. The shuttle must be moved forward two inches at every stitch, stopped, moved back, and stopped again. In sewing 600 stitches a minute, the shuttle must be moved 2,400 inches each minute, and be started 1,200 times and stopped 1,200 times. Of course, the power lost from the momentum was very considerable. Mr. Wilson attempted to produce a machine in which the shuttle should move in a circle, and the result was, first, the rotary shuttle machine; and finally, the rotary hook machine. The needle descends through the cloth, carrying with it a loop of thread which is opened by the hook, and, after being carried around the bobbin, placed loosely within it and containing the under thread, is thrown off. The thread being then drawn up, forms a lockstitch. By the introduction of the rotary motion instead of the reciprocating shuttle, power is economized, less cumbersome machinery is required, greater speed is attained, and there is less noise. About three yards of thread are required for a yard of seam. Prior to Mr. Wilson, no attempt had been made to introduce the sewing machine into the family. But with Mr. Wilson's introduction a new era dawned. Mr. Wood proceeded to describe the Wheeler & Wilson sewing machine. He said that, although the stitch was the same as that made by the shuttle, yet as the shuttle throws the thread a little zigzag, while the rotary hook makes a straight seam, a person conversant with the subject could tell at a glance whether work is done upon a Wheeler & Wilson or upon a Singer machine. The sewing machine has revolutionized thirty-seven branches of sewing; even harness work can be done with it.

The President inquired what further inventions had been made which were embraced in the best approved sewing machines.

Mr. Wood replied that there were several hundred others, which the time would not allow him to specify, such as binding gages, hemming gages, hemmers, markers, and other appliances to adapt the machine to the various kinds of work. Another improvement consists in the use of a glass foot, so that the operator can see the work as it is sewed. The tension of the under thread in Wheeler & Wilson's machine is regulated by the action of the rotary hook upon the bobbin; that of the upper thread is regulated by a volante spring.

Mr. Johnson inquired in what relation the late Walter Hunt stood to sewing machines.

Mr. Wood—It is understood that he is not entitled to the first iota of credit as an inventor of a sewing machine; that his experiments were never considered by him as of any value, and had passed entirely from his memory, and were only resurrected by persons interested in defeating Mr. Howe.

Mr. Haskell exhibited specimens of work done with the double lockstitch of Grover & Baker, for comparison. The Grover & Baker stitch was elastic, and less liable to rip in washing or in wear. Indeed, the stitch was so securely locked that even if every third stitch were cut, the work would not rip. It was unnecessary to fasten off the ends of the seam, for the same reason. Mr. Haskell proceeded to explain the operation of the machine. The stitch is formed by passing an eye-pointed needle down through the cloth, forming a loop, carrying the under thread; and the loop formed by the under thread is entered by the vertical needle as it comes down again. The stitches are, therefore, doubly locked together. The tension is so produced as to obviate the necessity of rewinding the thread. One-third more thread is required for the under thread with this stitch than with the shuttle stitch.

Mr. Orr said that a mere child could manage the Grover & Baker machine, whereas some skill is required to regulate the tension of the shuttle stitch to cause the under thread to be drawn into the cloth. While the stitch of the Grover & Baker machine will not ravel out itself, yet it is easy to take out the work as rapidly as it is put in.

Dr. Gardner suggested that it would be well to consider the question whether sewing machines did more good or more harm; and if it was decided that their influence was beneficial, then there would be the proper order for the discussion which of them was the best.

The President said that he had decided upon the opposite course. When the question of their utility should come up, he would have some remarks to make.

On motion of Mr. Hendrick, the subject was continued for the next meeting.

New Subjects.—The "Electric Telegraph," and especially the "Ocean Telegraph," was proposed by Mr. Dibben.

The "Natural History of the American Coal Fields," was proposed by the President.

On motion, the association adjourned

CORRECTION—CALORIC ENGINES.—Mr. Seely said, in the last debate upon this subject before the Polytechnic Association (October 31), that, although the difference of specific heat between air and water here had been overlooked by one of the schemes proposed by him at the previous meeting, yet he was prepared to show that this fact would *not* be fatal to it.

A GREAT SUCCESS.—In the month of July last, we procured a patent for E. Clemo, a chemist residing at Toronto, C. W., for an improved process for making paper. The Galt *Reformer* says that after vainly endeavoring to get paper manufacturers to make use of the discovery, George Brown, Esq., of the Toronto *Globe*, was informed of it, and being convinced of its immense value, became a partner, and patented it in England, France, the United States and Canada. Mr. Brown has recently visited New York about the matter. He was met here by a number of American capitalists —prominent among whom was Cyrus W. Field, of Atlantic Telegraph notoriety—and it is said an arrangement has been effected by which Messrs. Brown & Clemo are to receive some $800,000! The statement is quite current in Toronto, and has caused a most lively sensation.

AY WANTED FOR ETHER.—A communication was received from Messrs. B. & S. D. Cozzens, counsel of Dr. William G. Morton, asking the board for compensation for the use of ether in surgical operations. The patent expired on the 12th ult., and the Commissioner of Patents refused to renew it in consequence of the refusal of Dr. Jackson to join with Dr. Morton in asking for a renewal. Dr. Morton therefore asks for compensation from the board for the past use of the discovery, which he claims to have been used in the institutions under their charge.

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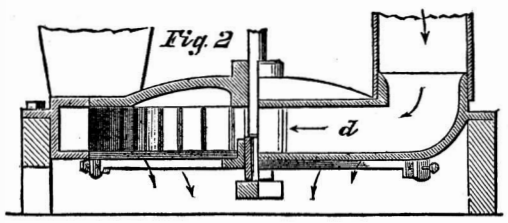
IMPROVED WATER WHEEL.

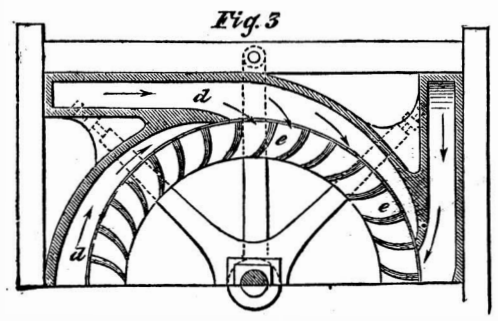
The accompanying engravings represent a horizontal, center-vent water wheel invented by James Martin, of Florence, Ala , which is now in use by the patentee, driving a cotton mill, and working in the most successful manner. It is simple in its construction, and is plainly shown in the cuts, of whlch Fig. 1 is a perspective view, Fig. 2, a vertical, and Fig. 3, a horizontal section.

The water is taken from the two large square pipes, A and B, Fig. 1, by the four vertical pipes, C C C C, Figs. 1 and 2, down to the level of the wheel, where it is turned to a horizontal direction, as indicated by the arrows in Fig. 2, passing into four chutes, *d d*, Figs. 2 and 3, which gradually contract towards the circumference of the wheel, forcing the water into the buckets, *e e*. The buckets are formed in curves of which the radii are equal to the width of the rim of the wheel, the spaces between the buckets being 4 inches apart at the periphery where the water enters, and contracted at the discharge in proportion to the head of water. The water thus entering on four sides of the wheel, any strain or pressure upon the axle is avoided, and when the velocity of the wheel is properly proportioned to the head of water, the motion of the water is nearly all transferred to the wheel, and thus a high percentage of useful effect is obtained.

In regard to the practical value of this improvement, the inventor says:—"This wheel has been fully tested as to great economy of water. I am now using one in my cotton mill, giving 35-horse power with a 40-inch



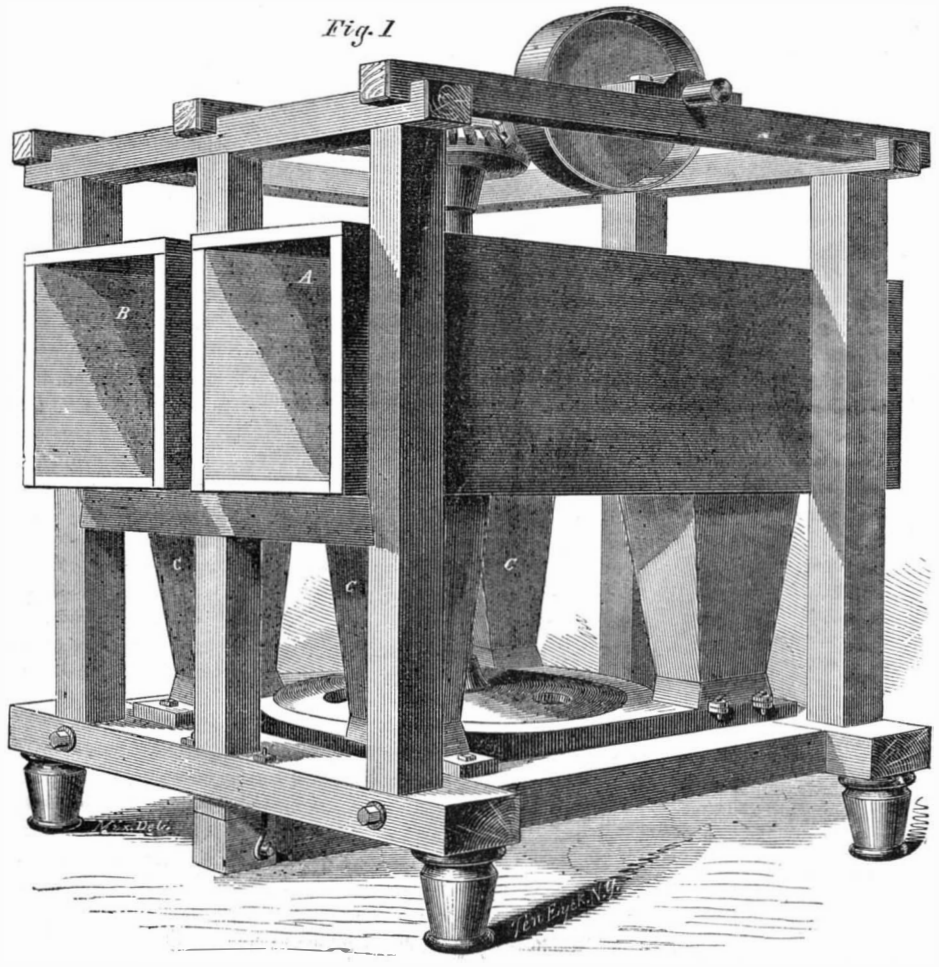
wheel, under a head of 12 feet, using but 200 inches of water, and the water being measured before it reaches the wheel, any waste around the wheel comes out of the amount. There is no humbugging by claiming that it



uses less water than it really does. The water is applied on scientific principles, and for simplicity, durability, and economy, of construction, it cannot be beat."

The patent for this invention was procured through the Scientific American Patent Agency, July 3d, 1860, and further information in relation to the matter may be obtained by addressing the inventor, James Martin, at Florence, Ala.

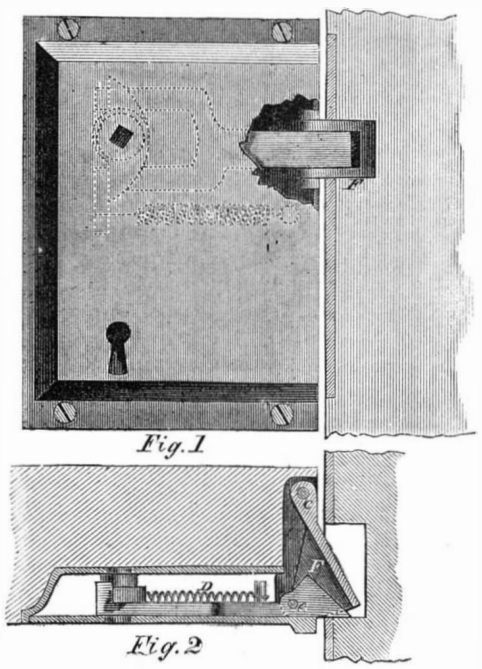
THE WAY LIGHT.—In giving an account of a lecture recently delivered in Philadelphia by Professor Rodgers, of the University of Philadelphia, the Philadelphia *Press* makes the lecturer claim the invention of the Way electro-light for the late Dr. Hare. This, we think, must be a mistake. He was the inventor of the oxy-hydrogen (Drummond) light, but we never read or heard of him as being the inventor of the electric light.



MARTIN'S IMPROVED WATER WHEEL.

SLAIGHT'S IMPROVED DOOR LATCH.

The principal object of the invention here illustrated is to obviate the necessity of slamming doors in shutting



them—a practice of no small annoyance in most households. As the necessity of slamming a door in shutting it arises from the bluntness of the bevel on the end of the latch, the obvious mode of remedying the evil was to give a more easy angle to this bevel. This is accomplished in this invention by hanging a plate or hood in front of the end of the latch, as represented in the cuts, of which Fig. 1 is a vertical section and Fig. 2 a horizontal section through the latch.

The hood, F, is suspended to the case of the lock by the pivot, *c*, and has its sides bent round on each side of the latch, D. By the considerable length of the hood a small angle with the plane of the door is obtained, and the latch is pressed very gently back into the case of the lock.

The latch is connected with the hood, F, by a pivot, *e*, and is carried out in the usual manner. This is to prevent any rattling or play between the door and the jamb on the shrinking of the wood in either, which might result from the circular movement of the end of the hood, F, if this arrangement were not adopted.

This simple little device seems admirably calculated to accomplish the important object for which it was designed.

The patent for this invention was procured, through the Scientific American Patent Agency, on Nov. 6, 1860, and further information in relation to it may be obtained by addressing the patentee, Thomas Slaight, at Newark, N. J.

MORTARS FOR BUILDING.

In common practice, the cohesion of mortar is greatly impaired by using too large a proportion of sand; it should never exceed two parts, by measure, to one of lime paste. A cask of lime weighing 280 lbs., made into eight cubic feet of lime paste, should be mixed with 16 bushels of damp sand. The notion used to be generally entertained that the longer lime was slaked before it was used, the better would be the mortar made of it. This, however, is not the case with our common fat lime and sand mortars. The sand should be mixed with the slaked lime as soon as the latter becomes cold, and no more water should be employed than will reduce the lime to a thick paste. In preparing mortar the unslaked lime should be placed on boards and sheltered from the sun and rains; it should be open above and surrounded with some sand. The water necessary to slake lime should be poured upon it with any suitable vessel, and care should be taken to stir the lime so as to bring the water into contact with every portion, when it may be left until all the vapor has passed off. The sand may now be incorporated with the lime by means of a hoe and shovel; and, if necessary, a little water may be added to produce a homogeneous consistent paste, when it is ready for use. Sand from the sea shore should never be employed for making mortar without being first washed with fresh water, because the salt left in such sand is liable to absorb moisture and prevent the mortar becoming hard. In putting up walls of brick or stone, care should be taken that the stones or bricks be moistened before they come in contact with the mortar. Every brick and stone should be laid in a good bed of mortar, and should receive a blow to fix it firmly. The bricks should not be laid merely as is the common custom, but forced down so as to press the mortar into all the pores and crevices. The superintendent of a building should give his personal attention to the vertical joints in walls, as the masons frequently neglect to fill them up with mortar.

THE ancients in hauling the large stones to erect the pyramids used to build inclined causeways on which they transported the huge blocks.

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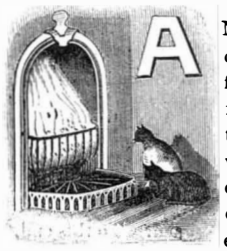
NEW YORK, SATURDAY, DECEMBER 8, 1860.

HEAT AND VENTILATION.



ANCIENT philosophers divided the material world into four great elements, namely: fire, air, earth and water, and they supposed that all bodies were constituted of these. Modern chemists have already discovered more than sixty different elements; yet, in a general sense, ancient science was not so very far wrong. At present, we do not know whether heat is a subtle ether or simply an action of matter, but we know a great deal about its operations and effects. All organic creation is dependent upon the proper distribution of heat, moisture, air, and earth (food). Deprive man of any one of these elements for a certain length of time, and he will cease to live. And as the normal temperature of his blood is the same in every climate, if it be elevated above 100° Fah., or depressed much below it, he soon becomes depressed and helpless. Man is so constituted that he only requires food and water at intervals of several hours, but it is far otherwise with air. A constant supply of this element is necessary every moment of his existence; he takes in fresh air and expels carbonic acid gas at every respiration. Our bodies must be maintained at the same heat in all places and at all periods of the year, and yet we live in a climate the temperature of which ranges from blood heat to more than a hundred degrees below it. The air which we breathe is the great vehicle of changes in our atmosphere. It comes warm from the south, mild from the west, and piercing cold from the icy north. To maintain health and life, therefore, we require the element air in certain quantities, and generally in a warm condition. A few words at this season of the year, on this important subject, may be of great service to many persons.

In nature, the currents of the atmosphere distribute pure air over the entire surface of the globe. The primary source of these currents is heat. It rarefies one stratum of air, causing it to extend, thus leaving a partial vacuum which is instantly filled up by the free cool air which forms an under current, thus maintaining a constant circulation. The true theory, therefore, is the production of a current of air by the displacement of the impure with a supply of fresh air. So efficient is this natural system of ventilation that chemists have been unable to detect any difference between the air of the most crowded cities and that of the most thinly peopled hamlets. It would be well for humanity if this system was more thoroughly understood and carried out, in cold climates, by those who occupy dwellings. When, on a cold day, we enter most public buildings, churches, workshops, stores and dwelling houses, we become sensible of the presence of noxious gases, independent of the warmth of the inclosed atmosphere. These gases are generally exhalations from the lungs; they tend to diminish vitality and produce disease. In cold weather, it is positively necessary to heat the atmosphere of rooms, in order to maintain the body at a constant temperature, but provision should always be made for the production of an artificial atmospheric current. In apartments heated by fires in open grates, this system is generally carried out in the most simple manner, and in buildings heated by steam pipes, or hot air furnaces, when suitable ventilators opening outward and placed near the ceiling, are employed, the same results are attained, because under currents of cold air generally find access under the doors and by other chinks in the rooms. But there are thousands upon thousands of houses heated by stoves and furnaces in which no provision is made for the exit of the impure air, and, consequently, no artificial current is formed in them. Fevers are very common in such dwellings.

A mistake is frequently made respecting the purity of warm and cold air in houses. A cold room may contain very impure air, because it may have remained unchanged for several days, just for want of a little fire to produce an atmospheric current, while on the other hand, a warm apartment may contain very pure air, owing to the maintenance of a constant current in it. With a distinct understanding of these views, every house may be ventilated in the most efficient and simple manner by the very agents which we require to heat them; this is nature's plan. There can be no doubt of the salubrity of warm houses in winter, and it seems that the colder the climate, so in the same degree the human frame requires warmer dwellings. The great object to which attention should be paid—and there can be no excuse for neglecting it—is to secure a constant and sufficient supply of warm fresh air. In this bit of knowledge is concentrated the true theory of artificial heating and ventilation.

WASTE COAL—CHANCE FOR A NEW INVENTION.

A correspondent writing to the New York *World* from Scranton, Pa., states that a loss of at least 20 per cent of coal results from breaking the lumps in small pieces for domestic use, and that the dross or *culm*, as it is called, is a perfect incumbrance at the mines and large coal yards. The consumers actually pay for this loss, as the lump coal is usually sold for about fifty cents less per tun than the broken screened sizes. He states that if persons would purchase their coal in lump size, and have it broken themselves with hammers, they would find that one tun of it would go as far as a tun and a quarter of the prepared sizes. With the loss sustained in blasting coal in the mines, and by breaking the lumps in machines, we believe, only about 75 per cent of the entire coal mined is utilized. This is certainly an immense loss.

One will see at any of the colleries of several years' standing in Pennsylvania hundreds of thousands of tuns of the waste coal standing in pyramids, and considered worthless. The question is now asked: is there no way to save this valuable fuel? Here is a chance for inventors. The people will not take the trouble to purchase lump coal and break it up; they rather pay more for the screened and assorted varieties prepared for their stoves, heaters and grates. But we believe the culm or dross may be pressed into blocks in machines, and thus made portable. It can certainly be employed for fuel in steamboats, and in the furnaces of steam boilers. We have no doubt but that the vast piles of coal dust now standing at the colleries may be converted into useful burning fuel, and, instead of being an incumbrance, it may be rendered profitable to mine owners. Artificial fuel is now made in England from coal dross combined with a small amount of adhesive substance, such as coal tar, and it is used on long voyages by many of the best steamships. This artificial fuel is pressed into blocks, and is well adapted for packing in the coal bunkers of vessels. It is our opinion that the owners of mines in Pennsylvania may profit by the example.

EXTENSION OF MCCORMICK'S TEN PATENTS.—Application has been made to the Commissioner of Patents to extend the ten patents of Mr. Cyrus H. McCormick, of Chicago, Illinois, for improvements in harvesting machines. A patent was granted to Mr. McCormick on the 23d of October, 1847, which was surrendered and re-issued on May 24th, 1853, again on the 21st of December, 1858, and then again on the 20th of September, 1859, when it was re-issued, divided into ten patents, numbered respectively from 816 up to 825, inclusive. The expiration of the original patent term will take place on the 23d of October, 1861. The testimony in this case will be closed on the 28th of January next, and the day of hearing before the Commissioner is set down for the 11th of next February at 12 o'clock.

STIMULANTS—ABSINTHE.

It has been observed by Professor Johnstone in his "Chemistry of Common Life," that every race above the condition of brutes use stimulants in some form. Alcoholic beverages in the form of wines, beer, and malt liquors; coffee and tea, and opium mixtures are in common use. Some of these stimulants are harmless, and some are even beneficial, when taken in moderation; but all of them are dangerous when taken in excess. It would be well for poor human nature if the most mild and safe stimulants only were taken; but although dreadful consequences are known to result from an immoderate participation in ardent spirits and opiates, yet there are thousands, and many of these are well educated and highly intellectual persons, who recklessly indulge in their use. The historian, Allison, has stated that drunkenness is the vice of cold climates, and in this opinion he may be correct; but warm climates have their vices also from the immoderate use of stimulants all of which are injurious. The Chinese indulges in his opium, and his "waking dreams" become luxuriant with fantastic scenery and incidents. The Hindoo takes his Indian hemp extract, and at once the chirp of a cricket sounds like the crack of a rifle cannon; the falling of a stream of water appears like a shower of rainbows; minutes seem like years, and the whole senses become fearfully and distortedly active. A new stimulant has been recently coming into pernicious prevalence among the artists and literary men of France. This is absinthine, the bitter principle of wormwood, which is soluble in alcoholic liquors, and is said to be very fascinating in its influence upon those engaged in exhausting mental pursuits. Like opium, it imparts a temporary stimulus to the brain, but its after effects are of a very prostrating nature. Several distinguished men in France are said to have fallen victims to its use, and the highest medical authorities in that country have denounced it, and yet its consumption is rapidly on the increase. We hope it may never come into use as a stimulant among our people. It has been asserted by some writers that the sensations and instincts are guides that should be followed. Without qualification this is dangerous teaching. As regards stimulants, the sensations are frequently of the most delusive character. Science in its very highest sense teaches us that the cravings of the appetite for stimulants in human beings should, in general, be resisted, not followed. Reason should control the sensations by guiding the will to resist the cravings of the appetite for many things. The practice of opium eating is becoming more prevalent in America; but as science and experience teach us that the use of this drug is a dangerous vice, any craving for such a stimulant should be resisted. We hope that indulgence in the new French drug, absinthine, will not be added to the growing and dangerous evil of opium eating. Those who are forewarned against it, are armed to resist it. Its use for a short period is very fascinating, but he who persists in it ultimately becomes a driveller and a mental paralytic.

DEATH OF DAVID DALE OWEN.

One of the most eminent men of science in America has lately been laid in "the narrow house appointed for all living." We regret to state that true and unostentatious worth is frequently so little regarded by the public, that it is passed by almost unheeded This was the case with David Dale Owen, the distinguished geologist, who died at New Harmony, Ind., on the 13th ult. While flaming accounts of the late Sir Charles Napier were generally copied from the British press, an obscure and brief notice from a Western paper was all that was communicated to the public of the death of Mr. Owen, who was a far greater man—in the proper sense of greatness—than the deceased admiral of the English fleet

David Dale Owen was a member of a most remarkable family. His father was the famous Robert Owen, the fanciful but honest philanthropist, who, for many years, filled a large space in the eye of the world, by his writings on education and associated labor communities. Old Robert was oftentimes called—and with much share of justice—"the father of the improved factory system." He did much to advance the machinery for spining and weaving cotton, and he was among the earliest managers of a cotton factory in Manchester. As the superintending partner of the cotton mills at New Lan-

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ark, Scotland, he made it a model factory, and the fame of this establishment attracted visitors from all parts of the world. In his labors he was counseled and assisted by his father-in-law, David Dale, Esq., of Rose Bank, near Glasgow, one of the most wealthy men and noblest christians in that country, and on whose death Owen declared that the world seemed like a blank In order to carry out his peculiar views regarding communities of associated labor, Robert Owen purchased, about thirty years ago, a large tract of land in Indiana, and called it New Harmony, where his system was tried and failed. This is what led the family to emigrate to this country.

The deceased gentleman was known to be a prodigy of scientific learning. He was an excellent chemist, a thorough mineralogist, a good civil engineer, and as a geological surveyor, he perhaps had no equal. He was a very active experimenter and, when not absent on geological tours, was constantly engaged in making analyses of minerals in the vast laboratory which he possessed at New Harmony. In 1838, he made the first geological survey of Indiana, and was subsequently appointed by the United States government to make a survey of the Northwest Territory. His report of this great undertaking was published at much expense by the government, and it is held to be one of the most able scientific works extant, both on account of the beauty and correctness of its illustrations and the felicity of its descriptions. After completing it, he was successively employed by the States of Kentucky and Arkansas to make geological surveys, and at the period of his death he was State geologist of Indiana. He was brother to Robert D. Owen, late United States Minister to Naples—author of a very peculiar work on mental and spiritual phenomena—and also brother to Professor Richard D. Owen, who is an original writer on scientific subjects. In private and public life, Dr. Owen was respected and admired for his integrity and urbanity ; he possessed the best geological collection in the western country, and in him Indiana has lost her most solid man of science.

IRON AND WOOD SCREW PROPELLERS.—In an article in the last number of the London *Quarterly Review*, on ships and their construction for war purposes, the writer states that all screw propellers should be built of iron for the following reasons. He says:—"There is not a single screw vessel of wood belonging to any port in England which has been built since the first experiments were tried; the fact being that it is impossible to frame timber together with sufficient strength to resist the working of a powerful screw acting with the enormous leverage due to its position in the vessel. So much is this the case that our full-powered liners or frigates can only use their screws in exceptional cases. If driven at full speed the seams open, the caulking escapes, and the whole vessel is so shaken as to become unfit for service in a very short time. No science, in fact, can frame wood firmly enough for the purpose, while it is very easy to make an iron hull sufficiently strong to resist the action of any screw driven by any engine that human hands can forge."

This is a question of vast importance to enterprizing shipbuilders and ship owners. Quite a number of large American wooden propellers have been built, but all have failed of entire success as merchant vessels, while foreign built iron screw steamers have become numerous in our ports. If the writer in the London *Quarterly* is correct, we have now a clue as to the cause of failure in our wooden-built ocean screw steamers. The course for us to pursue in view of this is to build iron vessels of this class. Three iron steamboats were constructed at New York during the past year; an iron screw steamer for Cromwell's Wilmington, (N. C.) line is now being built at the Novelty Works, and at the same establishment another iron steamer with a stern wheel is also being constructed to run upon the Magdelina river (S. A.) We are making some progress in iron shipbuilding; but there is still great room for a further extension of the business.

SCHAFER'S PUMP.—We see that this pump is receiving the very warm encomiums of the press. It is arranged to *increase* the length of the stroke of the piston; and it is therefore adapted to situations in which the power is great.

STEEL STEAM BOILERS.

The New York *Times* contains an article on the above subject in which it is suggested that puddled steel be employed as a substitute for wrought iron in boilers. In order to meet objections to its use it ridicules the experiment which was lately made in England with steel boilers on board of the steamer *John Penn*, from which, on account of a leak, they were removed after a very brief use and replaced with iron ones of the usual construction.

So far as it relates to strength, which is a most important feature, puddled steel is at least one-third stronger than wrought iron, and boilers made of it would certainly be, in our opinion, proportionably more safe from explosions in all cases whatever. The writer in the *Times*, whom we think we know, is an engineer of reputation, and he states that the steel boilers of the *John Penn* were in all likelihood very imperfect in their construction, adducing in support of his conclusions, that steel has been employed successfully for fire-boxes on the Scottish Central Railroad during the past four years, and in such situations it is more severely tried than in marine boilers. We hope further experiments will be made with steel in constructing boilers.

THE MOTION OF RIFLE BULLETS.—The subject of rifle cannon is attracting a great deal of attention in England, and the thorough discussion that it is receiving is bringing out many ideas of interest. Among others, we find this: When an elongated missile is discharged from a rifled cannon at a considerable elevation in order to obtain a long range, the rotation of the bolt causes its axis to continue parallel to the line in which it leaves the cannon, and hence it will not strike the target with its axis perpendicularly to the face of the target, but inclined at the same angle to the target that the gun has at the time of its discharge.

The *London Engineer* suggests that as the rifling of guns is only an expedient to counteract the effects of imperfections in either the gun or the shot, these may yet be made so perfect by improved machinery as to dispense with the necessity of rifling altogether.

PECULIAR SHEEP.—In the Punjaub, India, there is a breed of sheep so small that a full-grown one is not larger than one of our lambs of about four weeks old. These creatures have small bones, a full fleshy carcass, and the mutton is excellent. Each ewe has two lambs per annum and yields about three pounds of fine wool. This sheep would be excellent for our country, and some spirited stock raiser should import a flock of them. The habits of the sheep are as domesticated as the dog; it feeds on every kind of vegetable, grain, and fruit, and takes crumbs and fruit parings from the hands of its master. The country which this sheep inhabits has a climate similar in temperature to that of the United States.

WAVES OF FIRE.—A traveler in the Sandwich Islands, while visiting the volcano near Hilo, witnessed a wonderful phenomenon. As he was sitting at lunch on a high bank overlooking the crater, with his face turned to avoid the intense heat, he was startled by a noise like the rushing together of vast bodies of water, and was obliged to run to escape the great heat. The whole surface of the lake was in the wildest commotion, wave dashing on wave. Great billows of fire rolled from every side of the lake, meeting the fierce conflict, receding and rushing together again with increased force, shooting into the air, perhaps a hundred feet, a vast spiral body of red liquid lava, which finally combed over and fell in graceful spray back into the lake again. When the lake was restored to its usual order, it seemed to have fallen at least ten feet.

NOTICE TO ASSIGNEES OF PATENTS.—We have in our possession over one hundred assignments belonging to persons and firms residing in this city and Brooklyn, which have been returned to us from the record department of the Patent Office. Assignees who have deposited their deeds with us for recording, will please call or send to this office and receive them.

BLACK vulcanite is composed of india-rubber kneaded with sulphur and graphite, then subjected to the action of high pressure steam in a close chamber.

RECENT AMERICAN INVENTIONS.

The following inventions are among the most useful improvements lately patented:—

ROLLING IRON AND STEEL WIRE.

This invention (patented by John Wright, of Sheffield, England) consists in winding the wire to be reduced on a cast iron bobbin or reel, which is then placed in a box of the same metal; the whole is then placed in a furnace and heated to a required degree; after heating, the box is placed in close proximity to the rolls by which the wire is to be reduced, and the whole length passed through and rolled flat, as for watch springs or crinoline steel, or of other desired form; by this means, long lengths of wire may be reduced with great facility. The box is formed with a spout or channel, at which the wire is drawn out; the bobbin or reel is mounted on a spindle within the box, so as to afford sufficient freedom for unwinding the heated wire.

CULTIVATOR:

It is well known to agriculturists that the ordinary cultivators, which are employed for pulverizing the soil and eradicating weeds from growing plants in hills and drills, injure the young and tender roots which are near the surface of the ground, and which serve as the main feeders for the plants. The object of this invention (for which a patent has been issued to James H. and Edward H. Anderson, of Easton, Md.) is to obviate this difficulty, and, at the same time, cause the earth to be thoroughly pulverized and loosened. To this end, the inventors employ a cast metal, or a wooden shoe shod with metal, provided with suitable handles, and having a toothed cylinder behind it, all constructed and arranged to effect the desired end.

CLOSING OF VOLUME III, NEW SERIES.

After two more numbers, the present volume of the SCIENTIFIC AMERICAN will be closed. We sent notices to nearly 4,000 subscribers last week informing them that the term for which they had pre-paid their subscription would expire with this volume.

We hope every one will re-new, and, if posssible, secure some neighbor or friend to join him. We employ no traveling agents, but rely upon the merits of the publication, and our friends, for keeping up and increasing its circulation.

We have never applied to the latter in vain; and it is our intention to still improve the paper, and make it more worthy the patronage of the intelligent reading public than it has ever been before. For terms see prospectus on the last page.

It will be seen that clubs of 20 are furnished at $1.40 per annum, In what way, we ask our readers, can so small an amount be invested to so good profit. At the end of a year, after the gratification of reading the numbers as they come out weekly, you have a volume of over 800 pages, illustrated with more than 500 handsome original engravings.

WRITE NAMES PLAIN.—Our proof-reader and compositors consider themselves competent to decipher any words in the language, whatever the chirography, with the exception of proper names. These should always be written very plainly when intended for print. Two weeks ago the printers were puzzled over a name which they finally concluded was Hernshoof, but we have received a letter from the gentleman saying that it should be Herreshoff—J. B. Herreshoff. He is one of the four inventors of the Douglass skate.

COAL OIL PATENT—IMPORTANT CASE.—A most important trial, which tested the validity of Young's celebrated coal patent commenced at Edinburgh, Scotland, on the 1st and ended on the 7th of last month, before Archibald McNeil, Lord President of the Session, and a jury. Many distinguished men of science were examined as witnesses. We will give a rather full report of the case in our next number. The patent was sustaiued.

SUSPENSION RAILROAD FOR BROADWAY.—In a long communication to the *World* Mr. Wm. L. Haskins recommends Wickersham's celebrated railway (illustrated on page 172, Vol. IX. old series, of the SCIENTIFIC AMERICAN), for the relief of Broadway. He also recommends compressed air for driving the cars. His suggestions deserve universal attention.

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SUGGESTIONS FROM A LADY.

MESSRS. EDITORS:—I thank you for publishing my former suggestions, and in continuation, I would ask artizans why may we not have the roofs to our dwellings domed, both the central and the wings? The flat ceiling over our heads gives a prison-like feeling when contrasted, as it is constantly, with the beautiful dome of the sky. In the central, the second story would make a magnificently domed chamber. The wings, with beautifully domed ceilings and plenty of windows, would make one an inviting dining-room—the very atmosphere of which would furnish a salad for the viands; the other would make a miniature sky-house for that sanctuary, the most invaluable of all—the gathering-room of the family. As this is the place where most of the waking hours are spent, so it is the place where comfort, taste, and good cheer should be the ruling deities. If it is practicable to have the roof made of some translucent substance, like thick glass or thin marble, supported by a wooden or iron frame, this would be an additional beauty; and if the main rooms could be made circular, by making the corners into closets, presses, cupboards and libraries, it would give more harmony to all the senses.

My attention has lately been drawn to the scanty room in the railroad cars. (Ladies hooped skirts may have suggested the thought.) I would ask, is it not practicable to have the track made broader, and by increasing the breadth give more comfort and safety?

The extremely cruel task of the men who feed the fires on board our steamers calls for some alleviation. Their burned and blackened faces, streaming with perspiration in a stifling atmosphere, appeal for apparatus which shall do the work of feeding those fires without this peril to human health and life.

I will make no further suggessions in this letter, but will not promise to abstain from constructing ideal houses, cities, and air-cars in future. If capable of all these I should still consider that the greater work which makes home the paradise of earth.

M. L. VARNEY.

San Francisco, Nov. 10, 1860.

ENCASING STEAM BOILERS.

MESSRS. EDITORS:—I have been told by a gentleman, who claims to have demonstrated it by experience, that a steam boiler covered with a casing of pure copper, the latter resting upon the rivet heads, thus leaving an air space between the casing and the boiler, will furnish a given amount of power from 20 per cent less fuel than the same boiler worked in a precisely similar manner, but having a casing of iron, or any other metal, put on exactly like the copper. Though he is perfectly satisfied as to the results, he does not pretend to explain the causes which produce this saving, but thinks it is due to some electrical influence. The copper, he says, must be perfectly pure, and the air space is also absolutely necessary. If there be such results obtained from such means, there must be good reasons for it, and it is of great importance that the matter be understood. If, by the light of science, you can satisfactorily explain this matter, and will communicate your ideas on the subject to me, either through the columns of your excellent paper or by letter, you will greatly oblige.

SAMUEL COMFORT, JR.

Morrisville, Pa., Dec. 1, 1860.

[We distrust the correctness of the account of this experiment; there are so few people competent to try an experiment thoroughly and give a perfectly correct description of it. Was the coal carefully weighed and the amount of water which was evaporated carefully measured, when other substances than copper were employed under the same circumstances? There is great loss of heat by radiation from steam boilers, but wood, felt or plaster, we should suppose, would be better material for a jacket than copper, as they are slower conductors of heat. The air space is an excellent thing in a jacket.

STIRLING'S HOT AIR ENGINE

MESSRS. EDITORS:—In reading the discussion on hot air engines, published on page 310 of the present volume of the SCIENTIFIC AMERICAN, I noticed the question was asked, "Why its use was discontinued in the Dundee Foundry?" I was working there for the greater part of the time that the second hot air engine was running. A common beam engine had been transformed into the hot air engine by the addition of the heating air pump and other requisites. The great trouble with the air engine was the cracking of the heaters and their expense. They weighed about four tuns each. They had to be molded in loam, the same as the cylinder of an engine faced up in the lathe, and everything done that was required for fitting a cylinder head. Some would last for two months, others a year; and the time required for taking one out and making another was from a week to ten days. Stirling left the Dundee Foundry at the time it was discontinued, and it passed into the hands of Gourlay, Mudie & Co., who were not interested in it. The great expense entailed for new heaters was the cause of its discontinuance in the Dundee Foundry. The same cause led to its discontinuance in the factory at Dundee, viz., the expense of replacing the heaters and the stoppage of the factory so often for repairs. The hot air engine in the foundry had a very unsteady motion; so much so, that it was necessary to put new couplings on all the shafting when they put in the steam engine. JAMES GUTHRIE.

Boston, Mass., Nov. 30, 1860.

[The unsteady motion of the air engine in the Dundee Foundry referred to by our correspondent has also been experienced with the air engines on this side of the Atlantic. We have never heard of a large hot air engine which did not experience great difficulty and expense from the cracking of the large heaters necessary to warm the air; but on a small scale, such as a two or five-horse power engine, this difficulty may be overcome to a certain extent.

PRACTICAL VALUE OF THE STEREOSCOPE.

We take the following from the London *Photographic News:*— A novel application of the stereoscope was announced a year or two ago by Professor Dove. It consists in the detection of reprinted matter in the case of books, pamphlets, &c., and was based upon the impossibility, or at least extreme difficulty, of compositors, when setting up a page of type with the intention of producing a fac-simile of a page of printed copy, making the blank spaces between the separate words in a line, exactly the same width in the copy as in the original. Our readers may not all be aware that the blank spaces between the words which they are now looking at are made by placing very thin strips of lead or type metal, technically called "spaces," side by side between each group of types forming a word, and so arranging them as to obtain each line of the proper length. These lead "spaces" are so thin that in ordinary work it is never attempted to get exactly the same number between each word, but they are put in in more or less numbers, according to the way in which the words fall at the end of a line—if the line as it is set up in type falls a trifle short of the proper length, it is "spaced out;" and if it exceeds that length by a letter or two, some of the "spaces" are removed, or thinner ones used. In this manner it will be perceived that however accurately the compositor follows the words of his printed copy, and sets up his page in imitation of the original, he is sure to be sometimes incorrect with the spacings between the words. A knowledge of these facts led Professor Dove to imagine that if a stereoscopic slide were so mounted as to have the original printed page on one side, and the recomposed fac-simile on the other half, an inspection in the instrument would at once detect the reprint. And so it was seen to be on trial. The page of print which the eye apparently saw formed by the superposition of the two stereoscopic corpulæ presented the remarkable appearance of not being on the same flat surface, nearly every alternate word started up or retreated to a different plane from its neighbor and the whole effect was most strange and disjointed as if the observer were looking at three or four superposed sheets of glass, with the words forming the page dotted at random on different sides of the glass plates. We have thought it right to enter into this at some length, inasmuch as though it was mentioned in some scientific works when first discovered, it was never brought very prominently before the readers of the *Photographic News*, and also because a knowledge of the foregoing facts is necessary to a proper understanding of what the learned professor has recently discovered. It has been found that wires of different metals, drawn through the same plate, are not all of the same thickness, for they are of different degrees of elasticity, and after being drawn through the plate they expand to different amounts. This expansion is proved by the fact that with the exception of gold no wire can be drawn through the same aperture through which it has been pressed. Silver requires the least force, but the expansion caused by elasticity continues for several weeks. It appeared probable to Professor Dove that in stamping metals something similar would take place, and that medals of different metals, stamped in the same die, would be of different sizes. This would be most readily seen in those medals in which the impression is symmetrically arranged in reference to the edge, as is the case with the medals of the French Exhibition, in which the coat of arms encircle the French eagle in the middle. One of these in silver and one in bronze were placed in the stereoscope, the eagle being fixed in the middle. After some time the stereoscopic combined medals were seen in the form of a hollow escutcheon, and of the color of an alloy of the two metals. Evidently the reason of this lies in the nonius-like shifting of the individual lines of the impression. This same result was also obtained by the professor with large gold and silver medals, which were kindly entrusted to him by the royal mint in Berlin. It was probable that medals obtained by casting would show the same thing, and this was found to be the case with tin, bismuth, and lead, the casts in which were beautifully executed by Professor Kiss. The account from which the above is derived appeared in *Poggendorff's Annalen*, and also in the *Philosophical Magazine* for the present month. Hiero's crown led to the use of specific gravity to detect an adulteration. The stereoscope is a new means.

VALUE OF NEWSPAPERS.—One thousand pounds sterling has recently been offered in London for a complete set of the *Times* newspaper for a public library at Melbourne, Australia, but without success. The fact is an instance of the rising importance of the things that, at the moment, seem only of trivial value—scarcely worth preserving—but which, to succeeding generations, afford the most authentic sources of knowledge concerning the "form and pressure" of their time. The British Museum now collects and preserves everything; and the Bodleian Library, which was expressly debarred by its founder from admitting the vain and trivial light literature of the date of its formation, is now glad to purchase the sixpenny and shilling plays and pamphlets of that day at prices from £50 to £150 each.

AN important series of experiments connected with electric telegraphy have recently been communicated by Dr. Mathiessen to the Royal Society. He has been induced to investigate the influence which an admixture of foreign bodies has upon the electric conducting power of pure copper, by reason of the great discrepancies which different samples of copper wire presented, when tested for electric telegraphic purposes as to their power of conducting the electric current; some specimens of apparently equal purity having less than half the conducting value of others. In the outset of his experiments the doctor found that one great source of the discrepancies hitherto noticed has been the presence of oxygen, which, it is well known to smelters, copper absorbs with avidity. This element, when present in very small quantity only in the copper wire, reduced its conducting power from about 93 to about 70. The effect of carbon, sulphur, phosphorus, selenium, tellurium and arsenic were likewise tried, and in each instance the presence of the metalloid was found to have a strongly marked prejudicial effect on the conducting power, in some cases (with phosphorus and arsenic) sinking down from 93 to between 6 and 7. The effects of different pure metals, such as zinc, iron, tin, silver, gold and lead, were next tried, but with one uniform result, namely, that of deteriorating the conductibility, and Dr. Mathiessen has hence been led to this important conclusion, that "there is no alloy of copper which conducts electricity better than pure copper."

THE Great Salt Lake lies at an elevation of 4,200 feet above the level of the sea, and is seventy miles long. When its waters evaporate, they leave a deposit of about two inches thick of saline matter.

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MANUFACTURES IN MANCHESTER, N. H.—Manchester, N. H., built at the Amoskeag Falls, in the Merrimac river, is one of the cities of New England which have had a marvellous growth, rising from feebleness and insignificance to places of great business and industrial importance in a few years. In 1840, Manchester had a population of 3,223; in 1850, 13,932; in 1854, 19,897, and in 1860, about 25,000. Its growth began in 1838, at which time there were, within the limits of the city proper, not more than fifty inhabitants. We have before us a chart of the statistics of Manchester manufactures for 1860, from which we learn that the capital stock of the manufacturing companies is $6,840,000, which run 6,154 looms and 229,132 spindles. Number of female operatives, 4,890; male operatives, 2,490; consumption of cotton per week, 385,000 lbs.; of wool, 30,000 lbs.; yards made per week, 1,133,500; yards printed per annum, 17,500,000; 2,300,000 seamless bags per annum are woven here. The monthly pay roll is $139,200. Besides the manufacture of fabrics, steam fire engines, locomotives, and all kinds of mill machinery are made here; all kinds of axes, adzes, hatchets, &c., book and newspaper, castings, &c. Notwithstanding the large number of mills already in operation, it is said that not more than half the water power of Manchester has been brought into requisition, and that some operations will be developed ere long which will greatly increase the population of the city.—*World.*

EXAMINATION OF INVENTIONS AT THE PATENT OFFICE.—Through the Branch Office of the SCIENTIFIC AMERICAN, located directly opposite the Patent Office, Washington, D. C., we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor advice, not only as to the probabilities of his obtaining a patent, but also as to the extent of the claim that it is expedient to set up when the papers for an application for a patent are prepared. For a special examination at the Patent Office, we make a charge of Five Dollars. It is necessary that a model or drawing, and a description of the invention shall accompany the remittance. Address—

MUNN & Co., No. 37 Park-row, New York.

IN a recent report of the directors of the *Great Eastern*, it is stated that the screw shaft had worn itself down in the bearings to an extent of 4 inches. There were patches on the bottom from which the paint had been worn and these had rusted to the depth of 1-32 of an inch. Not a single rivet, however, was moved in the least.

THOUGH the surface of mother of pearl seems perfectly smooth to the touch, its reflection of prismatic colors is proved to be owing to exceedingly minute inequalities in its surface, shown by taking an impression from it in black wax, when the wax is found to reflect the same colors.

HERODOTUS, the father of history, tells of a building connected with the temple of Latona, at Buto, the walls of which were formed of a single rock 58.8 feet long, and as many in hight and depth. The covering or roof of this house was also a single block 5.28 feet in thickness. The interior was hollowed out of the solid rock.

WHY do printers not succeed to the same extent as brewers? Because printers work for the head and brewers for the stomach; and where twenty men have stomachs but one has brains.

SOME pieces of hemp rope fished up from the wreck of the *Royal George*, at Spithead, have been found perfectly sound after being about a century under water. The smell of tar upon them was quite fresh.

OBJECTS under water, to an eye in the air, appear larger than they are; and to fishes under water, objects in the air appear less than they are.

A street railway is about to be laid down in Manchester, upon the American system as introduced into England by Mr. Train.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING NOVEMBER 27, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

*** Pamphlets giving full particulars of the mode of applying for patents, size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

30,708.—W. H. Adle, P. D. Miles, and George Custer, of Norristown, Pa., for an Improvement in Corn Planters:

We claim, first, The combination of the two frames, A and D, standards, a a, shaft, m, and chains, o o, all being arranged substantially as and for the purpose set forth.

Second. We claim hoppers, K K, trough, H, slides, c c, pitman J, connecting rods, L L, automatic discharge spouts, R R, and clutch coupling, r, when the whole shall be constructed and arranged substantially as and for the purpose set forth and described.

30,709.—J. H. Anderson and E. H. Anderson, of Easton, Md., for an Improvement in Cultivators:

We claim the combination of the shoe, A, and toothed cylinder, E, constructed and arranged to operate substantially as and for the purpose set forth.

30,710.—Henry Austin, of East Liberty, Ohio, for an Improvement in Water Carts:

I claim as a new agricultural implement a cask with journals, draught frame and wheels, the whole being constructed and arranged in the manner and for the purposes specified.

30,711.—L. B. Benton, of Penn Yan, N. Y., for an Improvement in Cultivators:

I claim the arrangement of the tooth, C, shares and landside, D, frame, A, and bars, E, the whole being constructed as described for the purpose set forth.

30,712.—Andrew Benkelmann, of Langford, N. Y., for an Improvement in Plows:

I claim connecting the forward portion of the bottom, A, of the plow with the beam, by means of the adjustable coupling arms, CD, the arm, D, being secured to the beam by the face, c, and bolts, d d, as specified, and connecting the rear portion of said bottom, A, with the beam, by means of the pivoted connecting bar, G, and handscrew, H, the connection of the said bottom, with the handles being effected by the eye, n, and projection, o, or their equivalents, the whole arranged, combined, and operating substantially as set forth.

30,713.—Benj. Bower, of Millersburg, Ohio, for an Improvement in Corn Planters:

I claim the vessel, A, in combinatien with the slide, F, levers, M and R, and connecting rods, I and P, or their equivalents, when these several parts are constructed, arranged, and operated as and for the purpose set forth.

30,714.—John Boynton, of East Hartford, Conn., for an Improvement in Breech-loading Firearms:

I claim the rack, c, pinion, D, mainspring, H, in combination actuated by the lever, B, in the manner as described.

30,715.—E. W. Briding and F. G. Maxwell, of Baltimore, Md., for an Improvement in Horse Collars:

We claim the new article of manufacture described, viz., a horse collar, constructed of glazed canvas and leather, in the manner and for the purpose specified.

30,716.—E. L. Brown, of Brooklyn, N. Y., for an Improved Regulator for Heating Apparatus:

I claim the air vessel, H, with its stop cock, i, and regulator, m, as combined and arranged with the dampers, e and b, and the pipes, G and d for the purpose specified.

30,717.—J. S. Brown, of Green Point, N. Y., for an Improved Baby-jumper, Couch and Carriage:

I claim, first, The frame for holding the baby, composed of four posts, A A A A, bottom and top, B and B', grooved and perforated sideboards, C C, for supporting respectively the back, E, and table, D, all arranged substantially in the manner described.

Second, I claim the spring arms, c c, and straps, f f, in combination with the posts, A A A A, and perforations, e e e, in the sideboards, C C, as and for the purposes set forth.

Third, I claim the post, F, arranged as set forth, and secured to the seat by a spring bolt, j, and tenon, i, as and for the purposes described.

[This invention is termed a universal baby-tender, as it is intended to serve, by simple adjustments, as a baby-jumper—a chair-seat, wherein a child may be placed in a reclining or sitting position, and a carriage wherein the child may be moved about as in the common carriage, in all of which changes ample provisions are furnished for making the child comfortable and for supplying its wants.]

30,718.—C. H. Burbidge, of Middletown, Conn., for an Improvement in Cotton Scrapers:

I claim attaching the scraping wing of a cotton scraper to a suitable carriage or plow frame by a hinged joint and a pivoted brace rod, K, so as to allow said scraping wing to rise and fall with the uneven surface of the ridges, substantially as set forth.

[This invention consists in attaching the scraping wing to the standard of a plow frame by a hinged joint, so that the wing will rise and fall and accommodate itself to the unevenness of the ridge, thereby scraping the ridge in a better and more thorough manner than can be done with scrapers heretofore used.]

30,719.—Cyrus Chambers, Jr., of Philadelphia, Pa., for an Improvement in Machines for Folding Paper:

I claim, first, In folding a sheet where an inset is to be cut off, placing the inset by automatic mechanism on the outset and in proper position to receive the last fold.

Second, Combining in one machine the mechanism for cutting off the inset, placing it on the outset or main sheet in proper position, and folding it therewith.

Third, The combination with folding rollers of rotating cutters, when both are adjustable in the manner and for the purposes described.

Fourth, The supplemental stop, H', against which the inset comes when made adjustable with as well as independently of the stop, H, as and for the purpose specified.

30,720.—C. A. Clark, of Bloomfield, Iowa, for an Improvement in Cultivators:

I claim the arrangement of the crank axle, D, gage or propelling wheels, F F', lever, G, rear shares, h' h' h', forward shares, h h, longitudinal bars, A a b c d, transverse perforated bars, c c, and handles, m m', all in the manner and for the purposes described.

30,721.—J. W. Collins and R. Y. Wilkinson, of Clinton, La., for an Improvement in Cotton Scrapers:

We claim the arrangement of the hoe wheel, E, and shaft, D, with the yielding bar F, and spring, K, for the purpose of automatically raising the hoe wheel after it has been depressed by the operator, substantially in the manner described.

We also claim, in combination with a spring or yielding rotary hoe wheel for thinning cotton, the adjustable and non-yielding mold plows secured to the rear supports of the machine, for the purpose of thinning and molding cotton at one operation, substantially in the manner described.

30,722.—John Collman and Harm Feenders, of Freeport, Ill., for an Improvement in Glass Cutters:

We claim, first, The adjustable regulator. E, applied to the face of the bit, B, substantially as and for the purposes set forth.

Second, The combination of the cavity, b, spring, S, and pivot connection, a, between the bit and handle, operating in the manner and for the purposes explained.

Third, The described combination of the fixed jaw, F, sliding jaw, F', and set screw, G, with the handle, A, of a glass cutting instrument for the object stated.

30,723.—T. R. Cormick, of Cap-au-gris, Mo., for an Improvement in Plows:

I claim the combination and arrangement of the cross piece, w, tongue, m, axle, z, wheels, x, pieces, c, crosspiece, w, pieces, k, crosspieces, h, helves, n and P, chains, S, plows, O Q Z Y, rod, v, levers, c e f, and seat, l, substantially as described, for the purposes set forth.

30,724.—C. F. Cory, of Lebanon, Ill., for an Improvement in Furnaces:

I claim the special construction and arrangement of a furnace, having one or more open fronts, e e f f, Fig. 1, and the cold air chamber, e 2 e 2, Fig. 2, with the perforated or ventilating fire back, g g, hot air chamber, I, and valve, K L, the diaphragm drop guard or suspension back, P P, the cut-off, n, and check wall, q, as fully set forth and described.

30,725.—Trumen Estes, of North Bennington, Vt., for an Improvement in Friction Brakes for Bobbins:

I claim a self-adjusting or regulating break, c, constructed and operating substantially as described and represented, for giving an equal and proper tension to threads or yarns that are being drawn off.

30,726.—R. H. Ewing, of Clives, Ohio, for an Improvement in Hillside Plows:

I claim, in a hillside plow with two moldboards, F F', the manner of securing and of operating the moldboards, viz., by means of horizontal arms, q q, catch, t, and groove in point, k, together with the rods, v, or their equivalents, all arranged and operating substantially as and for the purposes set forth.

30,727.—Samuel Fisher, of West Windsor, N. J., for an Improvement in Plows:

I claim the combination of the pivoted beams, G, with the pivoted plows supported by a pin, when arranged to operate in the manner and for the purpose set forth, and this I claim whether the plows be made adjustable, and be raised or lowered, or held by the devices described, or by others accomplishing a similar object by substantially the same means.

30,728.—Peter Given and Eli Foreman, of Sumner Hill, Pa., for an Improvement in Rotary Harrows:

We claim the construction of the frame with the cross pieces, H H F F, in combination with the sliding bands, G J, and the grooved rollers, K K K K, constructed as described.

30,729.—W. W. Graves, of Fort Adams, Miss., for an Improvement in Cotton Plows:

I claim the scraping plate, F, when the same is attached to the end of a long and narrow landside bar, E, and otherwise arranged so as to cut and throw the scrapings down into the center of the furrow, as set forth.

[This invention consists in attaching to a projected landside bar on the landside of an ordinary light turn or shovel plow, a scraping wing, which is bolted and braced in such a position that its cutting edge will skim along the surface of the drill or ridge, cut off and thin out the young plants, and scrape the weeds down into the center of the furrow behind the plow.]

30,730.—J. J. Henry, of North White Creek, N. Y., for an Improvement in Blind Fastenings:

I claim the eccentric form of the socket, C, as described, so that the movements of the bar, B, after detaching the catch, may press the block, A, which carries the catch apart from the socket, C, substantially as set forth in the specification.

30,731.—Frederick Heyer, of Richmond, Va., for an Improvement in Sewing Machines:

I claim the pivoted levers, R, operating in combination with the shuttle race, O, substantially as and for the purposes set forth.

30,732.—J. Holyland and J. C. Holyland, of Rochester, N. Y., for an Improved Cracker Machine:

We claim giving an intermittent motion to the pressure rollers, D D, by means of the clutch and lever, H O, connecting rod, G, and crank, F, or their equivalents, substantially in the manner and for the purposes shown and described.

30,733.—Hosea Huntley and Wm. Caven, of Cincinnati, Ohio, for an Improvement in Cooking Stoves:

We claim the combination with the central longitudinal fire-box, C, of supply passages, E e', arranged to receive external air in front and admit it to the fire at the rear, in the manner and for the purposes set forth.

30,734.—H. M. Jacobs, of Hartford, Conn., for an Improved Machine for Burnishing Spoons:

I claim the arrangement of the horizontally sliding and vibrating shafts, K K, and the transverse traveling and reciprocating toothed ratch, F, to actuate the same in combination, in the manner and for the purpose substantially as set forth and described.

30,735.—C. L. Jones (assignor to himself and W. H. Tyree), of Richmond, Va., for an Improved Carpenter's Clamp:

I claim the arrangement of a stationary jaw and jaw frame, B B1 B2 B3, and a sliding piece, A A2, provided with oblique slots, A', in combination with a detachable jaw, G, and a screw, C, all the parts constructed and operating substantially as and for the purposes set forth.

30,736.—Samuel Keen, of East Bridgewater, Mass., for an Improved Machine for Skiving Leather:

I claim the application and arrangement of the reciprocating feed segment, N O P, substantially as and for the purpose set forth.

30,737.—H. J. Lake, of Conquest, N. Y., for an Improvement in Cultivators:

I claim, in combination with a cultivator, the swiveling of the thills thereto, so that they may assume a horizontal position when the cultivator is working on a hillside, for the purpose of relieving the horse from the pressure or gouging of the thills on his sides and enable the operator to better guide and direct the cultivator, as set forth and described.

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30,738.—Joseph Leeds, of Philadelphia, Pa., for an Improvement in Hot Air Furnaces:

I claim providing a surface of water over the lowest part or floor of the warm air chamber, and below the heater thereof, substantially in the manner described and for the purpose specified.

And in combination therewith, I also claim discharging spray or minute jets of water through the rising air in the warm air chamber, substantially as described and for the purpose specified.

30,739.—Alonzo Livermore, of Tremont, Pa., for an Improvement in Chutes for River or Canal Navigation:

I claim, first, Dividing the natural or artificial fall to be overcome in a stream into several smaller falls, in combination with the interposing between said smaller falls of a series of basins, pools or chambers, substantially as described.

I also claim, in combination with a series of basins, pools or chambers that are interposed between a series of falls, the current breakers, H, for the purpose set forth and explained.

I also claim, in combination with a series of basins, pools or chambers that are interposed between a series of falls, the lips, K K, for retarding the ingress and egress of the water to and from said basins, pools or chambers, substantially as set forth.

30,740.—T. S. Lockhart and J. A. Lockhart, of Wellington, Mo., for an Improvement in Plows:

I claim the arrangement of a bent rod, C C′ C″, serving as a standard, a collar, I, fastened to the inside of the moldboard, J, and a curved brace, e, in combination with the perforations, H H, in the standard and the nuts, G G, substantially as and for the purposes set forth.

30,741.—R. G. Matheny and L. R. Barnes, of De Kalb, Miss., for an Improvement in Plows:

We claim the arrangement of the bars, B B, connected with the beam, A, by the clamps, G, in connection with the adjustable feet or standards, F F, and bars, J J, attached to the bars, B B, and having the plows and scrapers respectively secured to them, the handles, C C, being attached to the bars, B, and landsides, b b, and all arranged as and for the purpose set forth.

[This invention relates to an improvement in that class of plows which are designed for cultivating crops, more especially that of cotton, and consists in a peculiar arrangement of turning plows and scrapers, whereby the labor of cultivating crops which are grown in drills is much reduced and the work performed in a perfect manner.]

30,742.—T. J. Mayall, of Roxbury, Mass., for an Improvement in Ordnance:

First, In combination with the swinging frame supporting the cannon, as described, I claim transverse braces provided with suitable bearings for so holding the shaft operating the automatic machinery referred to, as that its proper relation to said machinery shall not be disturbed by any movement imparted to the cannon, substantially as set forth.

Second, I claim the arrangement of the three levers, g h i, relatively to each other, in combination with the studded shaft, e, imparting to, and the spring clutch, j, receiving from said levers the requisite motions, whereby, at proper intervals of time, the breech is firmly grasped and released, substantially as described and for the purposes set forth.

Third, I claim arranging upon one and the same crank shaft at either side of the barrel, connecting rods for operating the devices for automatically loading and swabbing the chambers of the breech, essentially as set forth.

Fourth, I claim the arrangement and application of the several devices for automatically revolving and locking the breech, firing and thumbing its chambers with respect to one common cam shaft, substantially as described, so that the said devices shall all be operated by said cam shaft in perfect unison and with unfailing accuracy, as set forth.

Fifth, I claim the arrangement of springs of equal power and capable of compression and tension at either end of the platform, whereby the gun, in recoiling, will be acted upon equally and simultaneously at each extremity of the carriage and be accurately reset in position for the next discharge.

30,743.—C. W. McClanahan, of Victoria, Texas, for an Improvement in Cotton Seed Planters:

I claim the combination and arrangement of the reciprocating stirrer, J t t, rotary distributor, I r, crank arms, c K L, pitmans, M N, pin, d, slotted guide plate, m n, hopper, A, drill tooth, F, and coverers, H, substantially in the manner and for the purpose described.

30,744.—W. J. McCoy, of Cartersville, Ga., for an Improvement in Cultivators:

I claim the arrangement of the reversible beam, A, stock, B, with its braces, E C, plows, F, cutter, K, landside, j, standard, b, handles, D, and springs, H, substantially as and for the purposes set forth.

30,745.—Nelson Messenger, of Newark, Ill., for an Improvement in Cultivators:

I claim the arrangement of the horizontal boss, G G, with the pendent feet or bars, H, having the shares, I, attached in connection with the standards, F, to which the bars, G, are attached; the standards, F, being braced by rods, a, and the bars, G, braced by the rods, D, as and for the purpose set forth.

[The object of this invention is to obtain a simple and efficient cultivator of light draft—one that may be manipulated with facility—so as to be under the complete control of the driver or attendant, and leave the ground not only in a loose, light state, permeable by air and water, but also in a state favorable for the subsequent cultivation of the crop.]

30,746.—W. L. Milholen, of Center, Ala., for an Improvement in Cotton Scrapers:

I claim the arrangement of the beam, 1, braces, 5 5, bolts, 6 6, arms, 7 and 8, nuts, 10 and 11, shares, 4 4, hinge joint, 9, standard, 3, handle, 2, as described, for the purpose specified.

30,747.—R. C. Millings, of Charleston, S. C., for an Improved Thill Coupling:

I claim having the "goose neck," E, bent or curved so as to extend around the axle, A, at its back, and form a hook to catch against the axle, in case of the breaking of the coupling or clip, substantially as set forth.

[The object of this invention is to guard against accidents attending the breaking or giving way of the coupling or clip, a contingency of frequent occurrence, and one in which the driver has hitherto had but an imperfect control over the animal attached to the thills. This invention consists in having the "goose neck" of the coupling made in the form of a scroll, so as to encompass or extend around the axle and form a hook to catch against the same in the event of the breaking of the coupling or the clip, the "goose neck" forming a temporary connection and preventing the immediate detachment of the thill from the axle.]

30,748.—M. H. Moore and Alexander Satterwhite, of Rome, Ga., for an Improvement in Cultivators:

We claim the arrangement of the bars, D D D E E, beam, A, and feet, F, with the bars, G′, attached—the two latter parts being secured to the bars, E E, as and for the purpose set forth.

[This invention relates to a new and improved arrangement of means whereby two plows may be readily adjusted nearer together or further apart, as circumstances may require, and also so adjusted that they may have a greater or less inclination, to vary their depth in the earth, as may be desired.]

30,749.—James Morrison, of Clinton, Maine, for an Improvement in Seeding Machines:

I claim the vibrating spout or trough, I, stationary screen, H, hopper, E, and shoe, F, arranged for joint operation, essentially as and for the purpose set forth.

[This invention relates to an improvement in that class of seeding machines in which the seed is sown broadcast. The invention consists in the employment or use of a vibrating spout or trough, a stationary screen, a hopper and a shoe, whereby the desired work may be performed in a very efficient manner.]

30,750.—J. N. Neff, of Strasburg, Pa., for an Improvement in Hay and Straw Cutters:

I claim the reciprocating V-shaped knife, C, in connection with the feed rollers, H I, arranged to operate conjointly, as shown, to wit: the roller, I, being fitted in loaded bars, J J, and the roller, H, actuated through the medium of the pawl, M, lever, N, rod, O, and eccentric, P, as and for the purpose set forth.

[This invention consists in a novel and improved arrangement of a reciprocating knife and feed mechanism, and also in using, in connection therewith, a grinding or reducing apparatus, all being so arranged that straw, hay, stalks and other substances may be reduced to the required degree of fineness in an expeditious and perfect manner.]

30,751.—John Neidich and E. R. Girvin, of Lancaster county, Pa., for an Improvement in Cultivators:

We claim the gage or guide rod, K, with the sliding and binding plates, H, set or binding screw, I, in combination with the shovels, F, and their projecting screw ends, f, secured on said plates by the nuts, h, for adjustment, when made subsantially in the manner and for the purpose specified.

30,752.—Oscar Paddock, of Watertown, N. Y., for an Improvement in Hot Air Furnaces:

I claim the combination of weighted arm, K, connecting rods, G and J, and valves, C C′, arranged in the relation to each other and to the door, B, herein set forth, and operating substantially in the manner and for the purposes described.

30,753.—William Pauli, of Alexandria, Va., for an Improvement in Heaters for Railroad Cars:

I claim the arrangement of a heater provided with an upper chamber, c, above the fire box, A, side chamber, B, smoke pipe, E, tubes, F, when employed with tubes, D D, provided with upper and lower registers and rods, b b, operating substantially in the manner and for the purpose of heating railroad cars.

30,754.—Sewell Pearson, of Boston, Mass., for an Improved Sofa and Bedstead:

I claim the arrangement of the hinged arms, D D, back board, H, hinged back, E, and part, B, with the part, A, mattress, g′, and springs, d d′, all as shown and described, for the purposes set forth.

[This invention consists in constructing the frame of the sofa in two separate parts, so that there will be a bench with four legs or feet, and a frame or seat portion having arms and a back suitably cushioned and ornamented. The two parts being hinged together form a sofa with a seat divided horizontally and hinged together along the back edges. The whole is arranged and constructed in such a manner, and so furnished with springs, that each half of the sofa will have separate springs which, when the sofa is converted into a bed, will form an excellent spring bed bottom.]

30,755.—Charles Perley, of New York City, for an Improvement in Hawse Pipes:

I claim the movable cap or shutter applied to the inner end of the hawser pipe and clamped thereto, for the purposes and as specified.

30,756.—J. P. Pettit, of Cold Spring, Ky., for an improvement in Plows:

I claim the combination of the single conical, flaring roller, E, colter, C, sole, D, curved brace, F, and bar, G, the said parts being constructed and arranged in the manner and for the purposes set forth.

30,757.—H. D. J. Pratt, of Washington, D. C., for an Improved Marine Propeller:

I claim, first, The cutwater, A, and heel, B, or either of them, constructed and applied, substantially in the manner set forth, as a support to the propelling apparatus.

Second, In combination with a propeller hung and operated as described, the stationary vanes, I, whether placed on the sides or bottom of the vessel, or at one or both ends of the propeller, or within a cylinder surrounding it, as and for the purpose specified.

Third, Giving to the edges of the stationary vanes an undulating form the prominences of which pass between prominences of corresponding form on the edges of the propeller vanes, as shown.

30,758.—H. C. Ravenscraft, of Kingwood, Va., for an Improvement in Cultivators:

I claim the middle portion, A, in combination with the outer sliding rings, D and E, arranged and operating as above set forth.

30,759.—Francis Raymond, of Sandusky, Ohio, for an Improvement in Rotary Harrows:

I claim the finger, P, and roller, R, in combination with the adjustable box, L, when these several parts are arranged and operate substantially as set forth.

30,760.—J. S. Reeder, of Canton, Ohio, for an Improvement in Breech-loading and Magazine Fire-arms:

I claim, first, Broadly, the vibrating charger, K, for the purpose of carrying powder to the chambered breech, J.

Second, The cut-offs, k and k′, or their equivalents, for the purpose of retaining the powder in the vibrating charger and in the magazine while the powder is being carried to the chambered breech.

Third, The combination of pinion, 12, and rack, 11, with levers, 10 and 8, for transmitting motion to the vibrating charger, K, for the purpose stated.

Fourth, The magazine, D, in combination with the vibrating charger, K, for the purpose stated.

Fifth, Plate, b, in combination with piston, r, as and for the purposes stated.

Sixth, The combination of the hammer, 6, with chambered breech, S, as and for the purposes stated.

Seventh, The combination of chambered breech, J, with barrel, C, and vibrating charger, K, as and for the purposes described.

Eighth, The vibrating cut-off, a, or its equivalent, in combination with chambered breech, J, and ball magazine, E, as and for the purposes stated.

Ninth, The combination of lever, 2, projection, 2′, with spring catch, j, and curved projection, 4, as and for the purposes described.

Tenth, The combination of trigger protector, G, with chambered breech, J, as and for the purposes described.

Eleventh, The combination of keys, j j, with the side plates, B, and chambered breech, J, as and for the purposes described.

Twelfth, The combination of the removable hand guard with the trigger protector, G, as stated.

30,761.—J. W. Richardson, of South Braintree, Mass., for an Improved Machine for Cutting Leather:

I claim my said improved leather-cutting machine or arrangement of the windlass, its ratchet-retaining spring, connecting rope or ropes, and impelling pawl, with the table, the carriage, the knife frame, knife, and the holding rod, constructed, applied and made to operate together substantially as and for the purpose specified.

30,762.—A. W. L. Rivers, of Midway, S. C., for an Improvement in Plows;

I claim the combination of the bolt, d, slotted metal plate, e, wedge, i, and eye, h,—the whole being arranged as described, for the purposes specified.

30,763.—Noah Rogers, of Thomas county, Ga., for an Improvement in Cotton Cultivators:

I claim the arrangement of the handles, C, standard, B, with slot, f, rung, h, link, j, pin, i, standard, D, adjustable braces, g and F, moldboard, a, wings, K and l, and movable pieces, J and J—the whole operating as set forth.

30,764.—George Scott, of Steubenville, Ohio, for an Improved Machine for Raising and Kneading Dough:

I claim, first, A stationrry shaft, C, having arms or knives, D D, and a deflecting flanch or plate, E, projecting from it, in combination with a revolving dough reservoir, H, substantially as and for the purposes set forth.

Second, The combination of the hot water or vapor reservoir, J J, dough reservoir, H, flanch, E, kneading arms or knives, D D, substantially as and for the purposes set forth.

30,765.—Christian Sharps, of Philadelphia, Pa., for an Improvement in the Revolving Blocks of Revolving Fire-arms:

I claim the breech block, B, and detachable cap, A, when the latter is so adapted to the former that when the two are fitted together they shall become temporarily a permanent portion of each other, as and for the purpose set forth.

30,766.—Frederick Sigrist, of Napa county, Cal., for an Improved Clevis:

I claim making that end of the clevis, A, which is to receive the perforated end of the bolt, B, with a hole, b, closed at the bottom, at d, for the purpose described.

30,767.—Josch Slocum, of Syracuse N. Y., for an Improvement in Cultivating Harrows:

I claim a cultivating harrow composed of the two frames, C D, furnished with suitable teeth or plow, the side pieces of which frames are hinged at their ends and can be spread or contracted at their rear ends, and which are united by a center beam, A I B, composed partially of wood and partially of an arched iron bar, and supported on a pair of wheels—the whole being arranged to operate in the manner and for the purpose set forth and represented.

30,768.—Arnton Smith, of Girard, Ill., for an Improvement in Seed Drills:

In combination with the seed tubes, J J J, and plows K K K, I claim the arrangement of the rolling cutters, P P P, and springs, O O O, when used in connection with the sliding bar, M, bolt rods, U, and elevator, R, in the manner substantially as and for the purpose set forth.

30,769.—Isaac Smith, of Albany, N. Y., for an Improvement in Stove Grates:

I claim the combination of the grate, bed plate and hinge, as described, for the purposes set forth.

30,770.—D. E. Somes, of Biddeford, Maine, for an Improvement in the Construction of Buildings for Packing Meats:

I claim constructing a building whose walls and roofs include hollow air spaces, arranged substantially in the manner and for the purpose set forth.

30,771.—L. Stevens, of Dover, Ky., for an Improvement in Cultivators:

I claim the adjustable revolving toothed shafts, E E, in connection with the adjustable plow, L, all being arranged essentially as and for the purpose set forth.

[This invention consists in the use of revolving toothed shafts and a share arranged in a novel way, so as to be adjustable and applied to a frame provided with a driving wheel, from which the toothed shafts are driven, all the parts being so arranged that all crops grown in hills or drills may be cultivated; that is to say, have the ground between them pulverized and the weeds eradicated in a thorough and efficient manner.]

30,772.—N. P. Stratton, of Nashua, N. H., for an Improved Method of Winding Watches:

I claim, first, The winding barrel, a, with the winding arbor, C, attached thereto, in connection with the retaining ratch, D, spring, S, main gear wheel, E, and stationary hub, c; the outer end of the main spring, B, being attached to the barrel, a, and the inner end, 3, to the stationary hub, c, or its equivalent.

Second, I claim attaching the hub, c, or its equivalent, to the frame of the watch, in combination with the winding barrel, maintaining ratch and main gear wheel.

Third, I claim the application of the maintaining power directly to the winding barrel, substantially in the manner specified.

30,773.—H. G. Street, of Liberty, Miss., for an Improvement in Cotton Cultivators:

I claim the arrangement of the beam, A, handles, C C, standards, B and E, bar, D, share or point, b, and scraper, F, with its curve, f, the whole being constructed in the manner and for the purposes described.

30,774.—G. C. Taft, of Worcester, Mass., for an Improvement in Drill Frames:

I claim, as an improved article of manufacture, a portable drill frame in which parts, A B C G G, are all cast in one piece, in combination with coring out the parts, A and B.

30,775.—J. G. Taylor, of Philadelphia, Pa., for an Improved Breast Collar for Horses:

I claim a breast collar having the projecting metallic arch or bow, A, articulated or jointed to the tugs, B B, substantially in the manner described and for the purposes set forth.

30,776.—D. E. Teal, of Norwich, N. Y., for an Improvement in Apparatuses for Drawing Water:

I claim the employment of the brake and pawl lifter, F G, in combination with the crank, D, ratchet, C, and drum, B, as shown and described, for the purposes set forth.

[This invention relates to a combined stop and brake mechanism, applied to the windlass in such a manner that both may be actuated by manipulating the crank, or without taking the hand therefrom. The object of the invention is to facilitate and expedite the operation of the ordinary well windlass, and enable the operator to have perfect control over the ascent and descent of the bucket.]

30,777.—Charles Thurber, of Brooklyn, N. Y., for an Improvement in Calligraphs:

I claim the combination of the means, or the equivalent thereof, for giving the tablet a movement in the direction of the lines to be written, with the means, or equivalent theoreof, for giving it a movement at right angles thereto, substantially as and for the purpose specified.

I also claim the tracer and pen, with their connecting mechanism, substantially as described, in combination with the ink cup and guard plate, having a hole into which the tracer is to be inserted, as a guide to insure the entrance of the pen in the ink cup and to protect the point of the pen, substantially as described.

I also claim, in combination with the tracer and pen and their connecting mechanism, substantially as described, connecting the ink

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cup with the movable plate on which the point of the tracer acts, by a free lever, or the equivalent thereof, to enable the writer to regulate the dip of the pen in the ink, as described.

I also claim connecting and combining the pen with the mechanism operated by the tracer, by means of a rocking or vibrating arm and interposed spring, substantially as and for the purpose described.

And, finally, I claim connecting the writing and the inking apparatus with the frame on which the tablet moves, by means of a swiveling or turning frame, substantially as described and for the purpose set forth.

30,778.—J. B. Van Deusen, of New York City, for an Improvement in Sounding Apparatuses:

I claim so combining the screw, F, with the registering and indicating mechanism that, during the descent of the apparatus through the water, the said screw is kept in gear with the said mechanism by the resistance of the water to its descent, but that when the apparatus touches bottom the said screw drops out of gear, and that as the apparatus is drawn up the said screw is kept out of gear with the said mechanism, and permitted to revolve freely without affecting the said mechanism, substantially as described.

[An engraving of this invention will appear in the SCIENTIFIC AMERICAN next week.]

30,779.—S R. Warner, of London, Ohio, for an Improvement in Seeding Machines:

I claim the arrangement of the frames, A and B, the one hinged upon top of the other, the seed boxes, F, the seed slides, I, the discharge spouts, G, the valves, Q, the levers, M and N, and the plows, S S, the several parts being constructed and arranged as and for the purpose specified.

30,780.—O. H. Woodworth, of Upper Marlborough, Md., for an Improvement in Fences:

I claim uniting the panels of portable fences by means of the reversed wedge-shaped or alternate scurf joints, in connection with the jaws of the bracket or brace, to securely hold the joints, A, together, substantially as described.

30,781.—S. E. Woodworth and J. S. Wethered, of San Francisco, Cal., for an Improved Amalgamator:

We claim, first, The combination of steam pipes, k, with the hollow shafts, I, of the scrapers, S, and drag frames, C, of amalgamating and separating pans, for the purpose of introducing steam into said pans, all the parts constructed and operating in the manner described.

Second, The arrangement of a swinging frame, H, adjusting wedges, R, and ball joints, G, in combination with the pan, E, of an amalgamating and separating apparatus, all the parts constructed and operating in the manner described.

Third, The sliding sleeves, e', of the side discharge pipes, e, of the pan, E, in combination with swinging pans, B B, so that the said sleeves may be moved back out of the way of the edges of the pans, B B, when the latter or either of them are to be tilted, the whole constructed as described.

30,782.—John Wright, of Sheffield, England, for an Improvement in Rolling Steel and Iron Wire:

I claim the employment, substantially as described, in the heating and rolling of wire or other long lengths of steel and iron, of a box or chamber, B, and a bobbin or reel, A, combined substantially as set forth.

30,783.—J. N. Wyckoff, of Brooklyn, N. Y., and T. M. Fell, of Melvin Mines, Va., for an Improved Amalgamator:

We claim the application of steam internally in jets through stirrers or frames, G G, placed in a vessel, B, containing the pulp and mercury, substantially as and for the purpose set forth.

[This invention consists in admitting steam within a close vessel and in jets through stirrers or agitators, the steam being admitted directly into the pulp and mercury, and serving to aid amalgamation both by heat and a mechanical action.]

30,784.—G. C. Bovey, of Chillicothe, Ohio, assignor to himself and D. C. Ruggles, of Cincinnati, Ohio, for an Improvement in Farm Gates:

I do not claim broadly the use of the levers and rack and pinion for operating the gate, but I claim their arrangement when used in connection with the catch, m, and bar, c, for holding the gate firmly when open, all as set forth, for the purposes described.

30,785.—Wm. S. Bullen (assignor to himself and S. A. Clark), of Indianapolis, Ind., for an Improved Machine for Creasing Leather:

I claim the combination and arrangement of a series of creasing disks, E, upon and with spool or thimble, I, when these are made to revolve upon the axle, J, substantially as and for the purposes designated.

30,786.—J. R. Byler, of Salisbury, Pa., assignor to himself and H. W. Black, of Lancaster county, Pa., for an Improvement in Rakes for Reaping Machines:

I claim, first, The combined vertical and horizontal tripper, D C, and arm, E, in combination with the peculiarly slotted shifting lever, H, for operating the up and down motion of the rake.

Second, I also claim the sliding and turning rocker shaft, B 2, in combination with the crosshead base, S, and independent crank lever, O, and connecting rod, N, together with the grooved guides, F F, and clipper ridge, f, combined and arranged substantially as set forth, for the purpose specified.

30,787.—F. D. Hayward (assignor to himself and D. E. Hayward), of Malden, Mass., for an Improvement in the Mode of Holding Sockets of Molds during Vulcanization of Caoutchouc:

I claim the method described of holding the metal socket or other article around which the rubber is to be molded and vulcanized securely in the mold, as set forth.

30,788.—Richard Martin (assignor to himself and Alexander Priestly), of Philadelphia, Pa., for an Improvement in Machines for Damping Paper:

I claim the revolving roller, D, having a series of longitudinal ribs, x, with intervening flutes or grooves, in combination with a trough, B, and the rollers, G and C, the whole being arranged substantially as set forth, and applied to the damping of paper as specified.

30,789.—James Temple, of Bellefonte, Pa., assignor to Joseph Kyser, of Philadelphia, Pa., for an Improvement in Harrows:

I claim, in combination with the adjustable supporting wheels or rollers, E, the hinged levers, F F, for adjusting the hight of the harrow teeth, and raising and lowering either end of the harrow to pass obstructions, substantially in the manner and for the purpose described.

30,790.—Wm. L. Williams (assignor to himself and T. J. O'Connor), of New York City, for an Improvement in Machines for Bundling Kindling Wood:

I claim, first, A wood carrier, A, formed with several receptacles, into which the wood is packed as set forth, and from which it is delivered to be compressed into a bundle.

Second, I claim the slides, a and a, to deliver the wood into the trough and convey the same to the compressing part of the machine, as set forth.

Third, I claim the opening, d', at the end of the trough, b, for the purposes set forth.

Fourth, I claim the inclined side, e, at the end of the trough, for the purposes and as specified.

Fifth, I claim the shield, 2, attached to the follower, f, for the purposes set forth.

Sixth, I claim the jaw, i, formed and acting as set forth, to receive, hold and twist the wire that surrounds the bundle, as specified.

ADDITIONAL IMPROVEMENT.

H. H. Robertson, of Kingston, Mo., for an Improvement in Plows. Patented July 10, 1860:

I claim the arrangement of a hinged frame, consisting of a succession of angles, A A1 A2 A3 A4 A5, in combination with the beams, I, of an equal number of plows, all constructed and operating substantially as set forth.

Notes and Queries

H. G. F., of Ill.—The most convenient substance that you can use for deafening floors is dry sawdust. You should heat it to about 212° Fah., in drying, so as to destroy the eggs of insects which may be in it. Graphite paint, made of blacklead and linseed oil, is perhaps the very best to use for tin roofs from which rain water is conducted for domestic purposes. Lead paints if absorbed by the water, are poisonous; but graphite paint is quite innocuous. If a tin roof is perfectly tight, there no necessity for painting it on the inside, in your region.

FAIR PLAY.—Your article reviewing the position taken by us in reference to the Revisionary Board at the Patent Office is accepted, and will appear in our next number.

S. F. M., of S. C.—Either iron or cedar wood will make a pipe for a pump not injurious to health. Lead is dangerous.

J. C. S., of Mo.—The plan of generating steam by dropping water on hot iron has received a great deal of attention. So far, it has not been practically successful.

J. McN., of Iowa.—Several hundred feet of the Atlantic telegraph cable have been raised, and the cause of its failure is known. The coating was imperfect, and the salt water found its way through and rusted the conducting wire.

B. F. B., of Mass.—Your letter is interesting, but too long. As you say, it is one of the plainest problems in the philosophy of mechanism that the water by Giffard's Injecter is carried into the boiler by the momentum of the condensed steam.

J. F. A., of N. Y.—The construction of carpenters' rules so that they may be easily converted into a square is not new.

G. B. and S. D., of N. Y.—Your communications are received, but they are not exactly adapted to our paper.

A. F. O., of N. Y.—White crayons are made of refined pipe clay. A piece of hard chalk is about as good for writing on blackboards as a crayon.

A. G. W., of Ind.—There is no method known to us of furnishing a sufficient supply of air to a diving bell but by a force pump.

S. W. R., of Wis.—We have not seen any chair in use with movable rockers. The metal plates of thermometers may be laid off in the common "measuring machines" which are manufactured by J. Gould, of Newark, N. J. We do not know their price.

J. A. B., of Va.—We are not aware of any patent having been issued for a device to measure distances accurately in the manner you propose; but we have seen it stated in some of the English publications that "sights" of this character were used on some of the English prize rifles.

N. P. C., of Conn.—We have in press an edition of Patent Laws, which will also contain much other information relative to the best mode of obtaining patents, the nature of caveats, re-issues, &c., and much other information of practical use to the inventor, patentee and purchaser of patents. Also, a digest of the Patent Laws of foreign countries. As soon as the work is out you will find it advertised in the columns of this paper. The "supplement" to our regular issue, which we published sometime since, contains all the information we think you require concerning the stamping of patented machines with the date, and the penalty for neglecting to do so. Send two three cent stamps, and we will mail you a copy.

H. G. D., of S. C.—You will find a full description of the "Drummond Light," with an engraving illustrating the mode of constructing an apparatus, on page 161, Vol. II. (1847), of the SCIENTIFIC AMERICAN. In the same volume is an engraving of the celebrated speaking machine of Professor Faber, on which it is said he spent twenty-five years of incessant labor. The invention attracted much attention at that time, but we have never heard of it since. We saw it a number of times, and considered it the most wonderful piece of mechanism we ever saw.

S. B., of C. E.—We have received your sketch of the burglar alarm, by which the gas light is made to flame up when a window or door is raised or opened by a burglar. We have seen several similar devices. The burglars in this part of the civilized world are so crafty that they take care to become acquainted with the whole details of a house before they make an attempt to enter and rob it.

F. N. B., of Wis.—It would be very expensive to galvanize the large plates of iron that are used in making common steam boilers. For light boilers, such as the one you intend to employ, which will have to stand idle frequently, we think it will be advantageous to galvanize the metal, in order to protect it from rapid corrosion.

H. G. L., of N. Y.—Regarding hydrodynamics and dams, we think you may find all the information desired in Mahan's "Civil Engineer," in the chapter on rivers. It is published by John Wiley, No. 56 Walker street, this city.

S. T., of Pa.—After cast iron has been hardened from the liquid to the solid state, it is still at a temperature 2,192°; and in cooling down from this temperature it shrinks. But in the process of hardening it expands, as is shown by the absence of hollows in any part of the casting.

A. S. Y., of Md.—The idea of your friend that he can arrange machinery to carry back his water upon his wheel after he has once used it, and thus gain power, is a fallacy. It belongs to that class of delusions which are grouped under the general term of "perpetual motion."

H. N. B., of N. Y.—The best way to clean a meerschaum pipe is to boil it for a few seconds in a dilute solution of salsoda or the ley of wood ashes. This will convert the essential oil of the tobacco into soap, which may be washed away in warm water afterward.

MONEY RECEIVED

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Dec. 1, 1860:—

J. E. A., of Ill., $25; J. H., of Ill., $75; J. M., of Cal., $10; B. E. S., of Mass., $25; P. P. W., of N. Y., $25; B. & B., of N. Y., $30; G. S. L., of N. Y., $30; R. L. U., of N. Y., $20; L. S., of N. Y., $132; C. H. D., of Vt., $30; R. B., of Iowa, $30; H. R. D., of N. Y., $40; W. H. S., of Pa., $30; E. C. H., of N. Y., $58; H. S., of N. Y., $25; S. B. H. V., of N. Y., $25; H. & W., of Pa., $25; A. L. B., of Mass., $25; E. S. D., of N. Y., $30; C. H. S., of N. Y., $30; W. J. F., of N. J., $30; R. E., of N. Y., $30; R. & E., of Oregon, $200; R. H. H., of N. Y., $25; J. D., of N. Y., $30; E. W. K., of Ill., $25; J. B. S., of Pa., $30; W. H. S., of N. Y., $100; C. S. H., of N. Y., $30; G. W. H., of N. Y., $25; W. B. L., of N. Y., $25; J. G. O., of N. Y., $50; J. W. K., of N. Y., $250; G. D. H., of Mass., $30; C. & E., of Ohio, $35; J. F. F., of Cal., $30; J. W. G., of Pa., $25; J. S. C., of N. Y., $30; J. G., Jr., of N. Y., $25; G. W. B., of Mass., $30; D. H. T., of N. Y., $58; W. S. W., of Conn., $30; A. D., of Oregon, $20; J. K. S., of N. J., $45; H. G. N., of N. Y., $15; L. P. T., of N. Y., $25; B. T. B., of N. Y., $50; T. K., of N. Y., $50.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Dec. 1, 1860:—

J. G. O., of N. Y. (two cases); E. W. K., of Ill.; J. E. A., of Ill.; W. H. B., of Ill. (two cases); G. W. H., of N. Y.; W. B. L., of N. Y.; R. S., of N. J.; E. S., of Conn.; J. A. W., of Mich.; E. E. H., of N. Y.; H. & W., of N. Y.; M. A. W., of Cal.; W. H. T., of Mass.; J. A. C., of N. Y.; A. R. B., of Mass.; B. E. S., of Mass.; N. B. B., of N. Y. (two cases); J. S. N., of Cal.; R. H. H., of N. Y.; S. B. H. V., of N. Y.; C. H. D., of Vt.; T. K., of N. Y.; W. H. S., of Pa.; J. G., Jr., of N. Y.; H. & S., of Pa.; L. P. T., of N. Y.; H. S., of N. Y.; M. L. P., of Texas; C. & E., of Ohio; P. P. W., of N. Y.; J. M. R., of Ky.; B. T. B., of N. Y.; L. S., of N. Y.; H. F., of La.; J. A. C., of Ohio.

NEW BOOKS AND PERIODICALS RECEIVED.

HISTORY OF THE RAILROADS AND CANALS IN THE UNITED STATES—exhibiting their Progress, Cost, Revenues, Expenditures and Present Condition; by Henry V. Poor, Esq., Editor of the "American Railroad Journal," No. 9 Spruce-street.

This is the first work ever published, assuming to be a complete authentic history of the railroads and canals of the United States. It gives the organization and present financial condition of each company; the date of its charter, the commencement and completion of the work of construction, and facts of importance affecting the securities issued, the line of road, the equipment, the different classes of share capital, the funded debts, the dates at which the latter were issued and are payable, the nature of the security pledged for them, the rates of interest paid, and the dates and places at which both principal and interest are payable; the amount of capital invested yearly, the length of line in operation, the receipts from various sources, current expenses, net earnings, and amount and rates of dividends paid from the opening of the road. The work is, in fact, a full and complete history of each enterprise from its organization to the present time. The first volume contains 612 pages royal octavo, and embraces the railroads of the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia. It is illustrated by two large maps—one of the New England States, including Canada East, and the other of the States of New York, New Jersey, Pennsylvania, Delaware, Maryland, Ohio and Canada West. The maps are on a large scale, and each station on every road is laid down. They are the first of the kind published, and are admirable specimens of geographical accuracy and artistic skill. The second volume is now in course of preparation. We hail this work with sincere satisfaction. It fills up a great gap in literature relating to the engineering, commerce and finance of American railroads. The price of the first volume is $5.

EDUCATION; by Herbert Spencer. Published by D. Appleton & Co., Broadway, this city.

The author of this work is one of the ablest writers on the subject in England, and is a constant contributor to the British reviews. In it he discusses the great questions, "What Knowledge is Most Worth;" "Intellectual Education;" "Moral Education;" and "Physical Education." The proper education of mind and body are the most important questions which can interest human beings; Mr. Spencer discusses these like a philosopher.

RATES OF ADVERTISING.

THIRTY CENTS per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

GIFFARD'S BOILER INJECTOR—FOR SUPplying water to boilers by direct pressure of steam without the intervention of any machinery. The attention of engineers and others interested is invited to these newly invented instruments, now on exhibition and for sale by CHARLES W. COPELAND, No. 122 Broadway, New York. 2* 13

MECHANICS WANTED—IN ALL PARTS OF the United States, to manufacture and sell, or sell on commission, an article needed in every family. For particulars, address B. F. NORTON, Machester, N. H. 1*

GREAT CURIOSITY.—MAGIC CIGAR CASES, with secret drawer, sent free on receipt of twelve red postage stamps, to any part of the United States. Agents wanted, by whom large profits are made. Send for one as sample and terms to C. J. WILLIAMS, Lock Box 1,000, Providence, R. I.

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LABORATORY OF CHEMISTRY.—CONSULTATIONS and advices on chemistry applied to arts and manufactures, agriculture, metallurgy, mining surveys. Information on chemical fabrications, with drawings, such as colors, varnishes, coal oils, paper, gas, candles, soaps, dyeing, animal black, manures, acids, alkalies, salts, india-rubber, gutta-percha, &c. Address Professor H. DUSSAUCE, chemist (from the Conservatoire Imperial of Arts and Manufactures, Paris), New Labanon, N. Y. 1*

AMERICAN STOCK JOURNAL.—THE THIRD volume commences Jan. 1, 1861—Devoted especially to matters relating to domestic animals; the largest and cheapest paper of the kind in the world. Published monthly, at No. 25 Park-row, New York. Price, $1 per year, in advance. Specimen copies gratis
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Papers giving the above advertisement three insertions, and sending a marked copy to A. G. Hatch, Windsor, Vt., will receive a copy of the paper one year free.
1* A. G. HATCH, General Agent.

BRAZIL AND THE BRAZILIANS.—HIGHLY Interesting Lecture.—The only complete report of Rev. Dr. Fletcher's lecture before the New York Historical Society appears in No. 10 of the HOUSEHOLD JOURNAL, having been reported specially for it. Mailed to any address, on receipt of a three-cent stamp. To be had of all news agents. Publishers—A. HARTHILL & CO., No. 20 North William-street, New York. 24

H. W. BEECHER ON "YOUNG AMERICA."—The non-political, interesting and characteristic lecture just delivered by Rev. H. W. Beecher, on "Young America," will be found in No. 11 of the HOUSEHOLD JOURNAL (this week). Reported specially. Mailed to any address, on receipt of a three-cent stamp. Publishers—A. HARTHILL & CO., No. 20 North William-street, New York. To be had of all news agents. 24

SOCIAL RESPONSIBILITIES—BY J. B. Gough. This lecture, lately delivered in New York and Boston to delighted thousands, will appear in HOUSEHOLD JOURNAL No. 12 (next week). Reported specially. Mailed to any address, on receipt of a three-cent stamp. Publishers—A. HARTHILL & CO., No. 20 North William-street, New York. To be had of all news agents. 24

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Newspapers giving the above advertisement two insertions, and sending a marked copy to A. G. Hatch, Windsor, Vt., will receive a copy of the paper one year free.
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TO CANDLE AND SOAP MAKERS.—ADvices and information on the art of making Candles and Soaps, plans of Factories, drawings of Apparatuses, recipe to manufacture Candles and Soaps of every description—common, adamantine and French Candles; processes to purify Tallow, preparation of Leys, formula for hard, soft, resin and fancy Soaps; processes to bleach Palm Oil, and make Candles and Soaps out of it; essays of Tallows, Greases, Oils, Soaps, &c. Information in general. Address Professor H. DUSSAUCE, Chemist, New Lebanon, N. Y. 1*

E. G. KELLEY, NO. 116 JOHN-STREET, SOLE agent for the city of New York for the sale of the Oils manufactured by the Patent Paraffine Lubricating Oil Company, whose Oils are manufactured by his newly-discovered process, which gives them the properties of pure SPERM OIL. E. G. Kelley's Patent Triple-refined Paraffine Lubricating Oil, for cotton spindles and all kinds of fine machinery (No. 1), $1 per gallon; do., for heavy machinery (No. 2), 75 cents. Patent Triple-refined Illuminating Oil, superior to any in the market (No. 1), 75 cents per gallon. Common Illuminating Oil (No. 2), 65 cents. White Chemical Oil, for engines (No. 1), 75 cents; do. do. do., for heavy machinery (No. 2), 55 cents. Office for the sale of the Oil, No. 116 John-street. Agents wanted for towns and cities.
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CHARLES A. SEELY, CHEMIST, NO. 424 Broadway, New York.—Analyses of ores, minerals, articles of commerce, &c. Advice and instruction in chemical processes generally; advice on chemical patents. 20 8*

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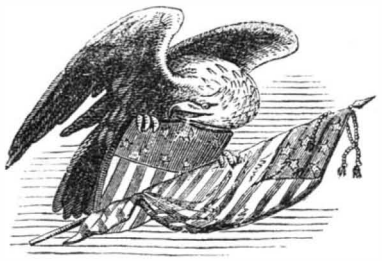
THE RISE AND PROGRESS OF INVENTIONS



During the period of Fourteen Years which has elapsed since the business of procuring patents for inventors was commenced by MUNN & Co., in connection with the publication of this paper, the number of applications for patents in this country and abroad has yearly increased until the number of patents issued at the United States Patent Office last year (1859) amounted to 4,538; while the number granted in the year 1845—fourteen years ago—numbered 502—only about one-third as many as were granted to our own clients last year; there being patented, through the Scientific American Patent Agency, 1,440 during the year 1859. The increasing activity among inventors has largely augmented the number of agencies for transacting such business.

In this profession, the publishers of this paper have become identified with the universal brotherhood of Inventors and Patentees at home and abroad, at the North and the South; and with the increased activity of these men of genius we have kept apace up to this time, when we find ourselves transacting a larger business in this profession than any other firm in the world.

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The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from our long experience, and the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a patent, &c., made up and mailed to the inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this office, and as a measure of prudence and economy, we usually advise inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

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Every applicant for a patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fee, by express. The express charges should be prepaid. Small models, from a distance, can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but little risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & CO., No. 37 Park-row-New York.

Circulars of information concerning the proper course to be pursued in obtaining patents in foreign countries through our Agency the requirements of the different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our branch offices.

TESTIMONIALS.

☞ The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

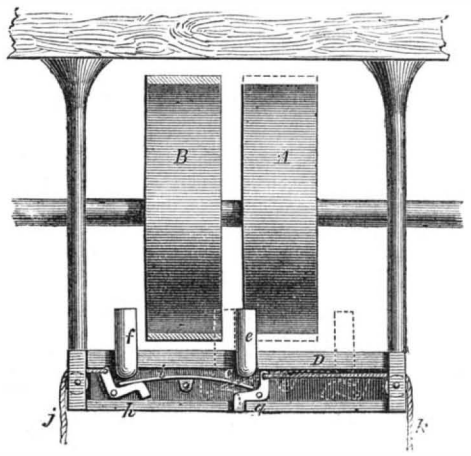
Messrs. MUNN & Co.:—Gentlemen: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

GOAR'S IMPROVED BELT SHIFTER.

The invention here illustrated belongs to that large class of inventions now being patented, which relate to improvements in the details of operating machinery. When improvements are applied, as in this case, to machinery in general, the patents are more likely to be profitable to the owners than, perhaps, any other class of patents whatever. This is an improved belt shifter, and, in some respects and in many situations, seems to possess advantages over any other that we have seen.

The cut represents a vertical section of the apparatus, with two pulleys, A and B, upon the same shaft, the pulley, A, turning loosely upon the shaft, and B being keyed firmly to the shaft, so as to carry the shaft with it in its rotations. The shifter is represented in the cut in position to hold the belt upon the tight pulley, B. The slide, C, with its two jaws, *e* and *f*, embracing the

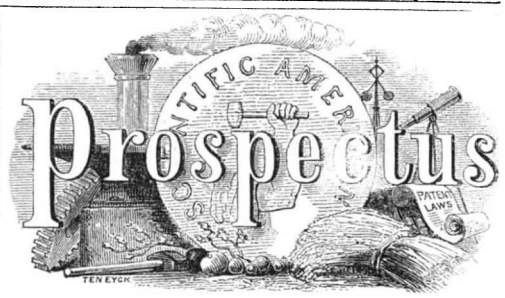


belt, is fitted to slip back and forth on the bar, D, carrying the belt along in its movements, and thus shifting it from one pulley to the other. When in the position shown in the cut, the end of the elbow-shaped lever, *g*, enters the notch in the bar, D, and thus holds the slide, C, securely in place. Now, if it is desired to stop the machine by shifting the belt to the loose pulley, A, the operator draws the cord, *j*, which first lifts the end of the lever, *g*, out of the notch, when a continued pull upon the cord draws the slide, C, along till the end of the lever, *h*, falls into the notch, where it is firmly held by the spring, *i*. By drawing the cord, *k*, the belt is shifted back upon the tight pulley, B. Behind the levers, *g* and *h*, pins are placed to stop the levers from being drawn too far over. The cords, *j* and *k*, may be led in any direction, or they may both be attached to a lever so as to be operated by moving the end of the lever back and forth.

Patents for this valuable invention have been secured, through the Scientific American Patent Agency, in France, Great Britain and the United States, the American patent bearing date Aug. 14, 1860. Further information in relation to it may be obtained by addressing the inventor, John C. Goar, at Binghampton, N. Y., or F. Z. Seymour, No. 27 State-street, Boston, Mass

THE WATER GAS EXTINGUISHED.—We see by the Philadelphia papers that the lighting of the Girard House by the water gas has been suspended for "repairs," and a legal demand has been made on the gas trustees to have the house supplied with the coal gas from the city works. Some of the pipes were found to be so filled with tar that it was found necessary to clean them out before the city gas could be introduced. The reconciliation of this foct with the statement that the water gas contained no condensable products, would afford a fine field for the ingenuity of Philadelphia lawyers.

ARTIFICIAL FISH BREEDING.—This is becoming quite a business in some portions of our country, and we do not see why it should not prove successful. A Mr. Kellogg, of Hartford, Conn., has already in the course of his experiments, succeeded in producing by artificial means, over 1,000 trout, which are now doing well. He has lately sailed for France to procure further information from the great fish breeders of that country. On his return, it is said, he will be joined in the business by Col. Colt, of pistol notoriety.



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The extent of the circulation evinces the popularity of the paper; and while our readers seem satisfied with the quantity and quality of matter they get in one year's numbers (comprising 832 pages and costing only $2), the publishers are determined to still improve the paper during the coming year.

The SCIENTIFIC AMERICAN has the reputation, at home and abroad, of being the best weekly publication devoted to mechanical and industrial pursuits now published, and the publishers are determined (if labor and enterprise will do it) to keep up the reputation they have earned during the SIXTEEN YEARS they have been connected with its publication.

TO THE INVENTOR!

The SCIENTIFIC AMERICAN is indispensable to every inventor, as it not only contains illustrated descriptions of nearly all the best inventions as they come out, but each number contains an official list of the claims of all the patents issued from the United States Patent Office during the week previous; thus giving a correct history of the progress of inventions in this country. We are also receiving, every week, the best scientific journals of Great Britain, France and Germany; thus placing in our possession all that is transpiring in mechanical science and art in those old countries. We shall continue to transfer to our columns copious extracts from these journals of whatever we may deem of interest to our readers.

TO THE MECHANIC AND MACHINIST!

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TO THE MILLWRIGHT AND MILL-OWNER!

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TO THE MAN OF LEISURE AND THE MAN OF SCIENCE!

Individuals of both these classes cannot fail to be interested in the SCIENTIFIC AMERICAN, which contains the latest intelligence on all subjects appertaining to the arts and sciences, both practical and theoretical; all the latest discoveries and phenomena which come to our knowledge being early recorded therein.

TO ALL WHO CAN READ!

Everyone who can read the English language, we believe, will be benefitted by subscribing for the SCIENTIFIC AMERICAN, and receiving its weekly visits; and while we depend upon all our old patrons renewing their own subscriptions, we would ask of each to send us one or more new names with his own. A single person has sent us as many as 160 mail subscribers, from one place, in a single year! The publishers do not expect every one will do as much; but if the 3,500 subscribers, whose subscriptions expire with the present volume, will each send a single name with their own, they will confer a lasting obligation upon us, and they will be rewarded for it in the improvement we shall be enabled to make in the paper by thus increasing our receipts. The following are the—

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